NOVEMBER 1921.] [Price 6s.

PROCEEDINGS

OF THE

LINNEAN SOCIETY OF LONDON.

133RD SESSION.

FROM NOVEMBER 1920 TO JUNE 1921.

LONDON:
PRINTED FOR THE LINNEAN SOCIETY,
BURLINGTON HOUSE, PICCADILLY, W. 1.
BY TAYLOR AND FRANCIS, RED LION COURT, FLEET STREET.

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Journal, Botany.

Vol. XLV.	No. 301.	20/-
	,, 302.	9/-
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Journal, Zoology.

Vol. XXXIV.	No. 228.	14/-
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Vol. XVII. Part 4. 12/-

Proceedings, 132nd Session, January 1921. 6/-

List of [Fellows, Associates, and Foreign Members], Nov. 1920.

PROCEEDINGS

OF THE

LINNEAN SOCIETY OF LONDON.

(ONE HUNDRED AND THIRTY-THIRD SESSION, 1920–1921.)

November 4th, 1920.

Dr. A. Smith Woodward, F.R.S., President, in the Chair.

The Minutes of the General Meeting of the 24th June, 1920, were read and confirmed.

The report of the Donations received since the last Meeting was laid before the Fellows, and the thanks of the Society to the several Donors were ordered.

Mr. Herbert William Pugsley, B.A. (Lond.), Mr. Raymond Alfred Finlayson, and Mr. Howard Hamp Crane were admitted Fellows.

New Certificates, in favour of the following, were read:—Keppel Harcourt Barnard, M.A.(Cantab.), Rev. Prof. John Fernand Caius, S.J., Ph.D., Major Arthur Dorrien-Smith, D.S.O., Albert Edward Mills, F.C.S., M.P.S., Samuel Lyon, F.R.G.S., Sydney Cross Harland, D.Sc.(Lond.), Charles Coltman-Rogers, Samuel Gordon Smith, Henry Ball, Capt. Bertram Hanmer Bunbury Symons-Jeune, Arthur Mayfield, Mrs. Bella Dytes MacIntosh MacCullum, M.A., D.Sc.(N.Z.), and William John Phillipps.

The President announced that there were now eight vacancies in the Fellows' list, and that the next ballot to fill these would be taken on the 9th December next.

The Treasurer showed the recently acquired volumes purchased by means of the Tagart Bequest, and commented on the use of buckram in place of leather.

The first communication was by Mr. J. H. Owen, M.A., entitled "Further researches into the Life and Habits of the Sparrow-Hawk, *Accipter nisus* (Linn.) Pall."

After preliminary remarks on some of the less-known habits of the Sparrow-Hawk, Mr. Owen showed a series of nearly 80 lantern-slides depicting various incidents of the incubation and nestling periods. The slides were from photographs of six different nests. Of special interest were series showing:—(1) The efforts of the hen to protect the nestlings from the effects of the sun; (2) The behaviour of the hen during incubation as affected by climatic conditions.

An animated discussion followed, in which the following engaged:—Mr. Harold J. H. Russell, Lt.-Col. J. H. Tull Walsh, Mr. Seth Smith (visitor), Mr. C. E. Salmon, Dr. W. Rushton Parker, and Miss Gulielma Lister, the lecturer replying to the various questions put.

The communication concerning the benefits to naturalists from the operations of the National Trust, announced for this meeting, was postponed to a later date.

The last communication was brought forward by Mr. H. N. Dixon, M.A., entitled "The Mosses of the Wollaston Expedition to Dutch New Guinea."

The mosses were unfortunately not described with the higher plants, but have since been worked out by the author, and have proved of great interest. Although consisting of only some 60 gatherings, the collection contained types of at least two new genera, *Hymenodontopsis* and *Callistomium*, and more than a dozen new species, including two new species of *Dawsonia*, a genus which is more highly represented in New Guinea than in any other part of its rather limited distribution.

A further collection by the Rev. J. B. Clark, of the London Missionary Society, in the neighbourhood of Boku, British New Guinea, is also included, and contains ten new species, including a very beautiful *Pterobryella*, and other interesting things. A small species, probably of *Rhizogonium*, named provisionally *R. orbiculare*, may possibly represent the ancestral form of the Rhizogoniaceæ.

Specimens of certain of these were exhibited, and also lantern-slides, some being photographs and others specimens, mounted as slides, of the mosses themselves.

Dr. A. B. Rendle, F.R.S., Sec.L.S., and Mr. Edmund G. Baker contributed further remarks, and the author replied.

November 18th, 1920.

Dr. A. Smith Woodward, F.R.S., President,
in the Chair.

The Minutes of the General Meeting of the 4th November, 1920, were read and confirmed.

The report of the Donations received since the last Meeting was laid before the Fellows, and the thanks of the Society to the several Donors were ordered.

Mr. Joseph Omer-Cooper and Prof. Otto Vernon Darbishire, Ph.D., were admitted Fellows.

Certificates, in favour of the following, were read for the second time:—Rowland Maurice Richards, M.B.E., Louis Blaise, Vicomte de Sibour, F.Z.S., Rustom Hormasji Dastur, B.Sc. (Bombay), John William Bodger, M.P.S., Vedaranyesvara Vaidyanatha Ramana-Sastrin, Ph.D., Lieut.-Col. Anthony Wolley-Dod, George Peddie Miln, J.P., Henry Baker Lacey, Miss Ethel Spratt, D.Sc., Keppel Harcourt Barnard, M.A. (Cantab.), The Rev. John Fernand Caius, S.J., Ph.D., and Major Arthur Dorrien-Smith, D.S.O.

Prof. E. S. Goodrich, F.R.S., read his paper "On a new type of Teleostean cartilaginous Pectoral Girdle found in young Clupeids."

The President and Mr. R. H. Burne added further remarks, and Prof. Goodrich replied.

Dr. J. C. Willis, F.R.S., F.L.S., followed with his lecture on "Endemic Genera in relation to others," showing numerous lantern-slides in elucidation of his remarks, abstracted as follows:—

In a paper of 1916 the deduction was made that, in general, endemic species of small area were not relics, but species in the early stages of spreading, and much evidence has since been brought up to show the truth of this. It is now proposed to extend this deduction to endemic genera, and to endeavour to show that there is no appreciable difference between a local endemic and an allied genus of wide distribution (of course working always with groups of genera) other than age.

The case of the endemic genera of islands is taken for detailed illustration, and a prediction is made about the general composition of the list of such genera. In the first place, it is clear that such a prediction can only hope to be successful if the islands obtained the bulk of their floras by means of land communications; if their floras be really casual oversea migrants, one can hardly hope ever to predict it.

Now, if the endemic genera of islands be in reality survivals—the current view—one would expect that they would at least show a tendency to belong to families that are small or of broken distribution, *i. e.* such families as we have been accustomed to look upon as more or less moribund. And in any case, one would not expect the great bulk of them to belong to the large and "successful" families.

If, on the other hand, age and area hold good (including the extended deduction above given), then the endemic genera should be found to occur on islands in proportions not dissimilar to the proportionate sizes of existing families. And further, as on this view the larger families are in general the older in their affinity circles, we shall expect them to be rather better represented (proportionately) than the smaller.

In order to test this question thoroughly, I have added up all the endemic genera of all the islands in the world, and for comparison also those (1) of West Australia, South Africa, and Brazil (the mainland areas richest in endemics); (2) of Australia, Africa, and South America; and (3) of the World. Examination of the tables thus obtained soon shows that if one take the families in groups of ten in order according to the number of genera they contain in the world (*i. e.* beginning with Compositæ and ending with monotypic families), the proportion of island genera to the total is closely the same throughout the list, and the same holds for all the four areas mentioned. Thus the first ten families contain 40·1 per cent. of the genera of the world, 39·4 per cent. of those of Australia, Africa, and South America, 40·5 per cent. of those of West Australia, etc., and 38·3 per cent. (606 genera out of 1582) of the endemic genera of islands. And the approximation is equally close all down the scale, so that the curves produced almost coincide.

Comparison shows with equal clearness that the proportional representation among the endemic genera of islands decreases as one goes down the scale. The first 100 families in the world have island endemic genera in 92, the genera being 12·9 per cent. of the total genera in the families. The intermediate 92 families are represented by 45 only, with 9·28 per cent. of their genera, and the last 100 by 13 with 8·72 per cent.

The second prophecy made above is thus fully borne out by the facts. Various pieces of confirmatory evidence are also given.

A discussion ensued in which the undermentioned took part:—Dr. A. B. Rendle, F.R.S., Sec.L.S., Lt.-Col. J. H. Tull Walsh, Dr. R. R. Gates, and Mr. C. C. Lacaita, the author replying.

December 9th, 1920.

Dr. A. Smith Woodward, F.R.S., President, in the Chair.

The Minutes of the General Meeting of the 18th November, 1920, were read and confirmed.

The report of the Donations received since the last Meeting was laid before the Fellows, and the thanks of the Society to the several Donors were ordered.

Mr. William Harold Pearsall, M.Sc. (Manch.) and Mr. Tom Russell Goddard were admitted Fellows.

The following certificates were read for the second time:—Mr. Albert Edward Mills and Mr. Samuel Lyon.

The following were proposed as Fellows:—Herbert Sutcliffe, A.R.C.S., Edward Jocelyn Wortley, M.B.E., F.C.S., William Small, M.B.E., M.A., B.Sc., William Frederick Bumsted, F.R.M.S., and Reginald Ernest Massey.

The following were elected Fellows:—Rowland Maurice Richards, M.B.E., Louis Blaise, Vicomte de Sibour, F.Z.S., Rustom Hormasji Dastur, B.Sc. (Bombay), John William Bodger, M.P.S., Vedaranyesvara Vaidyanatha Ramana-Sastrin, Ph.D., Lieut.-Col. Anthony Wolley-Dod, George Peddie Miln, J.P., Henry Baker Lacey, Miss Ethel Spratt, D.Sc., and Major Arthur Dorrien-Smith, D.S.O.

The President stated that Prof. R. Newstead, F.R.S., A.L.S., was unable to deliver his lecture on Uganda biology as announced, but hoped to give it at a later date.

Prof. E. S. Goodrich, F.R.S., Sec.L.S., gave a demonstration of the Hymenopterous Parasites of grain-infesting Insects, under a series of microscopes.

The second communication was by Mr. L. V. Lester-Garland: "Plants from Darfur collected by Capt. Lynes, R.N., with remarks on their Geographical Distribution," and was illustrated by a selection of the plants themselves and photographs of the district.

The discussion which followed was carried on by the President, Dr. A. B. Rendle, F.R.S., Sec.L.S., Mr. C. C. Lacaita, Mr. E. G. Baker, and Mr. T. A. Dymes, the author replying.

The last communication was by the General Secretary: "The Norseman in Canada in A.D. 1000, with the plants they reported." He explained that his remarks were limited to the introductory part of a lecture prepared four years previously, which had been postponed delivery. Starting from the paper read by Dr. Fridtjof Nansen before the Royal Geographical Society on the 6th November, 1911, he quoted from recent papers by Daniel Bruun and H. P. Steensby in 'Meddelelser om Grönland,' vols. xvi., xvii. in 1918, and a slight sketch by Prof. H. O. Juel, in the current volume of the 'Svenska Linné-Sällskapets Årskrift,' p. 61. The

course followed by the Norsemen was narrated, from their colonies in Greenland across Davis Strait, to the North-east coast of Labrador, southward through Belle Isle Strait to the valley of the St. Lawrence, and the tract of country on its right bank, where vines were found growing, unsown corn, and a tree called 'Masur,' these being regarded as *Vitis Labrusca* L., *Zizania aquatica* L., and an *Acer*. The reasons why these voyages were not continued were explained as due to the weak colonies at that time in Greenland, the actual starting-point, and the opposition of the natives, termed 'Skrælings,' who prevented any attempts at settlements in 'Vinland'—the Wineland of the sagas of Erik the Red, and of Thorfinn Karlsefni,—the northern part of New Brunswick.

Mr. C. C. Lacaita and Sir Henry Howorth, F.R.S. (visitor) spoke, the latter commenting upon the interest of the communication, the extraordinary hardihood and endurance of the Norsemen in their hazardous and long voyages, also the differences between the war-ships and fishing-vessels of the time.

January 20th, 1921.

Dr. A. Smith Woodward, F.R.S., President, in the Chair.

The Minutes of the General Meeting of the 9th December, 1920, were read and confirmed.

The report of the Donations received since the last Meeting was laid before the Fellows, and the thanks of the Society to the several Donors were ordered.

New Certificates, in favour of the following, were read:—Prof. Rajkumar Sen, M.Sc., and Prof. Sadao Yoshida, D.Sc.

The Certificates in favour of the following were read for a second time:—Sydney Cross Harland, D.Sc. (Lond.), Charles Coltman-Rogers, Samuel Gordon Smith, F.E.S., Henry Ball, Capt. Bertram Hanmer Bunbury Symons-Jeune, Arthur Mayfield, Mrs. Bella Dytes MacIntosh MacCallum, M.A., D.Sc., William John Phillipps, Herbert Sutcliffe, A.R.C.S., Edward Jocelyn Wortley, M.B.E., F.C.S., William Small, M.B.E., M.A., B.Sc., William Frederick Bumsted, F.R.M.S., and Reginald Ernest Massey.

The President announced that the next Ballot for Fellows would take place on the 3rd March. The following four Candidates are placed according to seniority, four vacancies having to be supplied:—Keppel Harcourt Barnard, M.A. (Cantab.), The

Rev. John Fernand Caius, S.J., Ph.D., Albert Edward Mills, F.C.S., and Samuel Lyon, F.R.G.S.

Mr. E. H. C. Walsh, I.C.S. retired, delivered a Lecture on "Lhasa and Central Tibet," illustrated by thirty-one lantern-slides from his own photographs.

The Lecturer gave a brief description of the country, the people, the religion, and the Government. The Tibetans call their country Pö (Bod) and themselves Pö-pa; the name Tibet is from Tö-Pö (Stod-Bod), which means "High Tibet," applying to the central tableland. The country extends 1600 miles in its greatest breadth and 800 miles in its greatest width from the Koko Nor to the southern bend of the Takiang or Blue River; the superficial area is more than a million square miles, and comprises the highest portion of the earth's surface, and is bounded on its southern frontier by the Himalayas, the loftiest chain of mountains in the world. The Lake region lies to the north, and the River region encircles it on three sides—west, south, and east; the former region is very dry, and cold; the River region contains the sources of many rivers, such as the Indus, Sutlej, Brahmaputra, Salween, Mekong, Yantse-Kiang, and Hoang-ho. The great plain known as Chang-Thang is 500 miles wide at its greatest width and mostly uninhabited except by nomads; the mean altitude is over 16,500 feet, the peaks 20,000 to 24,000, the passes 16,400 to 19,000, and the valleys 14,500 to 17,400. Vegetation is almost non-existent. The crescent, which partly encircles the plain, is inhabited by Tibetans; the central portion of the great plain is for the most part unexplored.

The slides showed natural features, as the frozen waterfall Dotag, as an instance of the intense cold at the high altitudes, yaks, people of various degrees, their houses and prayer-flags, Lamas and their monasteries, boats, and shrines.

In the discussion which followed, the President referred to the interest of the Tibetan elevation as one of the newest physical features of the earth's crust. Numerous remains of rhinoceros had been found in the Hundes region, and Hugh Falconer supposed that that part must have been raised about 8000 feet since Pliocene times, when the large quadrupeds lived there. According to certain American theories, the rise of the Himalayas may have isolated a northern tract of the great Indian forest which was inhabited by several great apes during the Miocene period. The new inclement conditions might so affect the life of the apes in this isolated northern tract as to drive them to the plains and thus originate man.

Sir Nicolas Yermoloff, K.C.B., remarked that there were many Lamas amongst the Siberian soldiers in the Russian troops.

Mr. H. J. Elwes, F.R.S., referred to Sir Joseph Hooker's statement (Himal. Journ. ii. 150) that the yak bred once in two years, and asked if that were correct, as no other traveller seemed to have noticed it.

Mr. C. C. Lacaita pointed out that all the people shown on the screen were exclusively men, and asked if the women were secluded, he also enquired as to the prevalence of polyandry, especially in the higher classes. He appreciated the buttered tea of the Tibetans as a restorative.

The Lecturer replied to the questions put: he could say nothing about the yaks in the matter of their breeding; that women were not secluded, and that it was only by chance that the selected slides showed none.

February 3rd, 1921.

Dr. A. Smith Woodward, F.R.S., President, in the Chair.

The Minutes of the General Meeting of the 20th January, 1921, were read and confirmed.

The report of the Donations received since the last Meeting was laid before the Fellows, and the thanks of the Society to the several Donors were ordered.

Mr. Henry Baker Lacey and Mr. John William Bodger were admitted Fellows.

Certificates in favour of the following candidates were read for the second time:—Prof. Rajkumar Sen, M.Sc., and Prof. Sadao Yoshida, D.Sc.

The President announced vacancies in the list of Foreign Members, through the deaths of Dr. Franz Steindachner, Prof. Wilhelm Pfeffer, Prof. Yves Delage, Dr. Odoardo Beccari, Prof. Alfred Gabriel Nathorst; and a vacancy in the list of Associates, through the death of John Reader Jackson.

Dr. Annie Porter, F.L.S., and Prof. H. B. Fantham exhibited a specimen of a new flagellate found in the blood of a bony fish, *Dentex argyrozona,* occurring in Cape waters. The flagellate has been named *Herpetomonas denticis.* It is unusual to find such flagellates in the blood of Vertebrates, but similar flagellates occur in the alimentary tract of Insects and a few other Invertebrata. The significance of the occurrence of *Herpetomonas* in Vertebrates is interesting, as a resting form of such a flagellate may occur in man in India, Mediterranean countries, and South America, giving rise to serious diseases such as Kálá-ázár and other Leishmaniases. The occurrence of such flagellates suggests the possible evolution of Leishmaniases from parasites in the gut of blood-sucking insects or other Invertebrates becoming able to live in the blood of

Vertebrates, such as man. The *Herpetomonas* found in *Dentex*, however, does not appear to be markedly pathogenic.

Prof. E. S. Goodrich, Sec.L.S., having spoken, Lt.-Col. Tull Walsh observed that the specimen shown will be of great interest to the medical profession. Besides the *Leishmania tropica*, which it resembles, we have *L. donovani*, the cause of Kálá-ázár, a very deadly disease in Eastern Bengal, Assam, etc. In this disease only the ovoid form of *Leishmania* exists, in man. Sir Leonard Rogers was, however, years ago, able to cultivate the flagellate form. Both forms exist in the fish mentioned by Dr. Porter. The flagellate form of *L. donovani* is so like a flagellate found in *Nepa cinerea* that the latter can be used in England to illustrate, for teaching purposes, the flagellate form of *L. donovani* occurring in subtropical countries, in cultures from the form found in man.

Mr. Miller Christy, F.L.S., followed with his communication on "Wistman's Wood," supplying the abstract here printed:—

Wistman's Wood is a small unique grove of ancient, and exceedingly gnarled and diminutive, oak trees (all *Quercus pedunculata*), growing out of an extensive pile of huge angular blocks of granite (known locally as a "clatter"), without a particle of visible soil. The wood is hung (so to speak) upon the steep left bank of the West Dart, about two miles north from Two Bridges, almost in the centre of Dartmoor, and at an elevation of about 1500 feet. Its area is small (about 5–6 acres at the outside), and the number of trees comprised in it is probably not more than from 300 to 400, in spite of statements to the contrary.

Wistman's Wood is not a remnant of a primæval forest which once covered Dartmoor, for none such can ever have existed. It may be, however, the only survivor of other similar groves which once occupied some of the deeper and more sheltered valleys. It owes its continued existence, beyond question, solely to the "clatter" of granite blocks out of which it grows; for this protects it, not only from fire, but also from all animals grazing on the moor; these being unable to cross it, owing to the steepness of the slope and the *crevasse*-like open spaces between the great masses of rock, which are piled together in great confusion. For the same reason, access to the wood is, even for human beings, a climb or scramble, rather than a walk; while, within the wood itself, progress is even dangerous, owing to the *crevasses* being hidden by an abundant growth of moss, many tussocks of *Luzula sylvatica*, and other herbage.

The oaks (with which grow two or three bushes of *Pyrus Aucuparia*, but no other kind of tree) are all exceedingly dwarfed. Their average height is, perhaps, 10 feet, the highest not exceeding 15 feet. Many are of bushy or scrubby habit, presenting no definite stem, and few (if any) have a stem 4 feet high. In the case of adult trees, presenting measurable stems, the average circumference ranges from 40–60 ins., but one measured reached 78 ins.

Yet these toy-like oaks are unquestionably of great age—probably well over 500 years—as has been proved roughly by cutting sections in order to count the number of concentric (annual) rings. This has been done on several occasions; but the results have not been conclusive, owing chiefly to the narrowness and closeness of the rings, due to extreme slowness of growth, from the hard conditions under which the trees exist.

The trees are remarkable also, apart from their small size, by reason of their fantastically-gnarled and twisted branches, reminding one strongly of the tiny Japanese trees grown in pots for decorative purposes. A feature still more unusual (at any rate, so far as oaks are concerned) is the extent to which even the topmost branches of the older trees are overgrown by huge masses of moss, long shaggy lichen, and the common *Polypodium vulgare*, giving them an enormously bulky appearance. The interior of Wistman's Wood presents, indeed, an altogether strange and weird aspect, as seen from photographs shown, believed to be the first of their kind taken. Yet, in spite of many statements to the contrary, the trees appear healthy (there being none either dead or dying). Moreover, they produce acorns, though few in number; there are also young trees.

The Wood has long been known, and there have been many notices of it in print. The earliest was, probably, that of Tristram Risdon, written just three centuries ago, which shows the wood to have been then almost exactly the same, in all respects, as now. The others (which include an "Ode" to the wood) are, for the most part, too incorrect, or too pervaded by ideas of "Druids" and "Pyxies" as inhabitants of the wood, or too tinged with poetic fancy, legend, and superstition, to present many points of scientific interest. The present is believed to be the first adequate description of the wood.

Wistman's Wood, though it belongs to the Duchy of Cornwall, ought to be scheduled under the Ancient Monuments Act or placed under the protection of the National Trust.

A discussion followed: Dr. D. H. Scott referred to the annual rings, enquiring whether the author had observed two rings in a year, when the original show of leaves had been devoured by caterpillars, but renewed from the midsummer shoot. Mr. D. J. Scourfield (visitor) remarked that the Japanese trees were dwarfed in some measure by special pruning, and that the oaks in Wistman's Wood were self-pruned. Mr. H. N. Dixon hoped that some local society would study the flora of this Wood from an ecological point of view; he compared the growth in this case to rain-forest in the temperate zone. Dr. E. J. Salisbury pointed out that the native oak-woods are composed of *Quercus sessiliflora*. Mr. C. C. Lacaita enquired if the acorns were plentiful; in the Western Highlands the oaks produced but few acorns. Mr. Miller Christy replied briefly.

Mrs. Agnes Arber, D.Sc., F.L.S., gave an account of her paper "On the Leaf-tips of certain Monocotyledons."

Dr. D. H. Scott and Dr. A. B. Rendle, Sec.L.S., contributed further remarks, the author replying.

The last paper, "Seeding and Germination of *Ruscus aculeatus*, Linn.," was explained by Mr. T. A. Dymes, F.L.S., as shown in the following abstract. He stated that in the South-Eastern quarter of England the berries and seedlings perish by severe frost although the adult is hardy. Many seeds fail to germinate, because immature. Germination begins in July or August with the extrusion of the radicle; the cotyledon remains within the endosperm. During the first season the plumule is merely a short axis, completely invested by scale-leaves; it remains underground from the close of the first season until the following summer. Frost kills many seedlings during the first winter. Better results are obtained by sowing, as soon as the seeds are ripe, at a depth of one inch than at a greater depth or in the spring. Survivors in the second season produce an axis some three inches long, bearing a few scale-leaves and, at the apex, about six phylloclades in the axils of scale-leaves, which are longer than those of the adult. The radicle perishes, and adventitious roots are produced of about five inches in length. During the second winter the seedlings are unable to withstand severe frost. There is no recapitulation of the ancestry by the seedling.

Mr. E. G. Baker, Mr. C. C. Lacaita, and Mr. E. Step took part in the discussion, the author replying.

February 17th, 1921.

Dr. A. Smith Woodward, F.R.S., President, in the Chair.

The Minutes of the General Meeting of the 3rd February, 1921, were read and confirmed.

The report of the Donations received since the last Meeting was laid before the Fellows, and the thanks of the Society to the several Donors were ordered.

Mr. William Henry Kitching and Prof. William Grant Craib, M.A., were admitted Fellows.

The following were proposed as Fellows:—William Edward Hollows, M.P.S., Santi Prosad Sen Gupta, B.Ag., Shanker Ganesh Sharngapani, B.Ag., Donald Ward Cutler, M.A., and John Noel Milsum.

Dr. Rendle read a communication from Prof. Giovanni Battista De Toni, F.M.L.S., entitled "A Contribution to the Teratology of the Genus *Datura* L."

A discussion ensued, in which Mr. W. R. Dykes, Lt.-Col. J. H. Tull Walsh, and Dr. G. C. Druce took part.

Capt. J. Ramsbottom then spoke on a collection of Macedonian plants made by various members of H.M. Salonika Forces. The first numbers gathered in the autumn of 1917 proved of great interest, and the preliminary idea of making as complete a collection as possible was therefore persisted in. An attempt was made to direct the interest in Natural History subjects that was encountered when giving talks on Botany in hospitals and Y.M.C.A. huts. Use was also made of the 'Balkan News,' the daily paper published for the troops, in order to point out the great value of a proper investigation of the flora of Macedonia and also to give full directions as to how best to collect and to dry plants. Permission was obtained from the Commander-in-Chief to hold a plant-collecting competition amongst Warrant Officers, non-commissioned Officers, and men, the conditions of the competition being published in General Routine Orders, and thus reaching every member of the Force.

The result of the competition, having regard to the hazards of active service, was satisfactory, as it also had the effect of centralizing effort and attracting a considerable number of other collectors.

The districts in which the principal collectors were stationed were indicated on a map, and lantern-slides were shown illustrating the different types of country met with in Macedonia.

Mr. A. J. Wilmott, who followed, pointed out that the main interest of the collection, apart from the value of the material from this little-known region, lay in the features of endemism which the Macedonian flora exhibited. Endemics are said to be both numerous and abundant, which seems to be true so far as one can judge in a poorly explored area. It was suggested that one of the first duties of the student of distribution should be to discover and delineate natural floristic areas, the next duty being to convert taxonomists to using them. It must be emphasized that the general custom of using political boundaries completely obscures the essential facts and is entirely unnecessary, since all areas whose floristic relations are doubtful can be kept separate until their flora is known, when the relationships should be obvious. To draw no distinction between localities in Bulgaria north of the Balkan ridge and those (in "Thrace") south of it, does not permit distributional features to be obvious unless one is very well acquainted with the topography of the country. Natural areas in the Balkans were shown on a sketch-map. Further, the ultimate topographical subdivisions should be two-fold, one by river basins for lowland species, the other by hill

masses for the upland species, for the barriers to distribution are diverse in the two cases.

The features of endemism are also obscured by superficial or bad identification, for not only is the presence of an endemic form hidden, but the more restricted distribution of the commoner species is also obscured, an equally troublesome matter since the limits of distribution are the important point to determine, no matter whether the limits are narrow or wide. When one finds that a writer has only casually determined many plants recorded, he is forced to distrust all records which are not verified by actual specimens of the form carefully recorded from all sides of the locality in question. As this is often difficult to do in a single herbarium, the element of doubt becomes painfully large in some cases. Adamović's determinations are often bad: Velenovský's work is more careful but still insufficiently critical. One has to revise each of his statements before accepting it, a matter difficult to do with the insufficient material in this country. Boissier is out of date: great numbers of new species have since been described from the Balkans, making a large mass of undigested and often untraceable pamphlet material. It is therefore unsafe to frame theories of Balkan endemism at present, but some hypotheses were offered for consideration.

Of the 4000 or so sheets of the collection less than a quarter has been determined in more than a year; but numerous errors and confusions have been cleared up, as the material available is from a relatively small area and sufficient in most cases for serious study. It is a great pity that no serious collection was made between Vodena and Ostrovo, the type locality for many of Grisebach's species.

A series of the specimens of interest was exhibited, including several forms believed to be new to science.

It was pointed out that *Silene juvenalis* (=*S. subconica*) is a common plant in Macedonia, and that its occurrence on the reopened silver mines at Laurion, in Greece, is not surprising. Heldreich's suggestion that it had sprung up from seed which had been dormant 1500-2000 years may be dismissed. *Glaucium Serpieri*, Heldr., of which the same was postulated, is not most nearly related to an Asia Minor or Persian form, but is either a variety of *G. flavum* as Halácsy places it, or a local or endemic form. It deserves more critical study.

Dr. Rendle considered this collection as the best of all service collections, resulting in so large an accession of specimens for the British Museum. It was of great importance as allowing a fairly intensive study of a definite area.

Mr. C. C. Lacaita referred to the splendid preparation of the specimens, so important for study in the herbarium. He also mentioned that round Athens *Anemone fulgens* was abundant; farther north various colours were prevalent, and that seeds of the latter had in his own garden yielded during many years the

varied tints in question, though, owing to the less brilliant sunlight, they were not so striking as in their native country.

Mr. W. B. Turrill (visitor) related his experience of various areas when on service in much the same tract of country.

Capt. Ramsbottom and Mr. A. J. Wilmott briefly replied.

Dr. G. Claridge Druce next gave a short account of botanical work in the Shetlands, and showed a *Plantago* from the north of Balta Sound, which seemed so distinct from the surrounding *P. maritima, P. lanceolata*, and *P. Coronopus* as to be worth discrimination; it may be compared to *P. maritima* var. *minor* Hook., renamed by Boswell Syme as var. *hirsuta*. He also showed other plants gathered in July and August 1920, enumerating *Cerastium subtetrandrum* Murb., *Potamogeton suecicus* C. Richt., *P. rutilus* Wolfg., *Rhinanthus borealis* Druce, and *Poa irrigata* Lindm., as new to the flora.

A short time spent in the Orkneys with Col. H. H. Johnston resulted in adding two plants to the Scottish flora—*Nitella nidifica* Ag. in the Loch of Stenness and *Chara canescens* H. & J. Groves. (See p. 77.)

Mr. E. G. Baker considered that the specially noted *Plantago* did not materially differ from the variety *hirsuta* of Syme, in which opinion Mr. H. W. Pugsley joined.

Mr. C. C. Lacaita drew attention to the great interest of the plants occurring on the Serpentine formation, a remark which held good in the case of New Caledonian plants recently before the Society.

Dr. Druce replied, pointing out that *minor* was preferable to *hirsuta* on the score of earlier publication.

March 3rd, 1921.

Dr. A. Smith Woodward, F.R.S., President, in the Chair.

The Minutes of the General Meeting of the 17th February, 1921, were read and confirmed.

The report of the Donations received since the last Meeting was laid before the Fellows, and the thanks of the Society to the several Donors were ordered.

Dr. Ethel Rose Spratt was admitted a Fellow.

John Hyacinth Power, F.Z.S., and George Tertius Dickson were proposed as Fellows.

Prof. John Merle Coulter, Dr. Samuel Garman, Prof. Giovanni Battista Grassi, Prof. Louis Alexandre Mangin, and Prof. Jean Massart were proposed as Foreign Members.

Certificates, in favour of the following, were read for the second time :—William Edward Hollows, Santi Prosad Sen Gupta, B.Ag., F.R.H.S., Shanker Ganesh Sharngapani, B.Ag., F.R.H.S., Donald Ward Cutler, M.A., and John Noel Milsum, F.R.H.S.

The following were elected Fellows :—Keppel Harcourt Barnard, M.A. (Cantab.), The Rev. John Fernand Cains, S.J., Ph.D., Albert Edward Mills, F.C.S., M.P.S., Samuel Lyon, F.R.G.S., Sydney Cross Harland, D.Sc. (Lond.), Charles Coltman-Rogers, Samuel Gordon Smith, F.E.S., Henry Ball, Capt. Bertram Hanmer Bunbury Symons-Jeune, and Dr. Sadao Yoshida.

The President announced that Ballots would take place on the 5th May for Fellows and Foreign Members, and on the 16th June for Fellows.

Mr. R. T. Gunther exhibited and spoke on certain Manuscripts in the Library of Magdalen College, Oxford, the following being an abstract of his remarks :—

The Manuscripts exhibited were all bequeathed to Magdalen College, Oxford, by John Goodyer with his botanical library in 1664. Goodyer had not been a member of the College himself, but knew it through his father having been a tenant of a College farm at Alton (where John Goodyer was born), and through his brother-in-law, William Yalden of Sheet, who acted as one of the College bailiffs and clerk of the account, and also through his heir and nephew, Edmund Yalden, who became a Demy and Fellow of the College.

The Manuscripts, bound in Goodyer's time, include his own translations of Theophrastus and Dioscorides into English; the latter has not been undertaken by any other scholar either before or since. One volume contains a long list of Grasses with their synonyms and short descriptions, descriptions of various plants copied from Lobel's MSS. (now lost ?), and an Index of Plants in Goodyer's hand, an Index to Gerard's Herbal (1597) and Stonehouse's Catalogue of plants growing in his garden at Darfield in 1640. The loose papers recently sorted and bound comprise a part of the MS. material for Lobel's projected work, *Stirpium Illustrationes*, now bound in three parts, the first of which, containing the descriptions of 223 species of Grasses, has been bound in a cover which appears to have originally held notes *De Febribus* by Lobel's master, Rondelet; a volume of the leaves from which How's selection from Lobel's 'Stirpium Illustrationes' was printed in 1655; this is a relic of the highest interest, typographical as well as botanical, and because it contains Lobel's original

imprimatur signed by the President of the College of Physicians and other members, an original letter from Argent to Lobel, and How's own animadversions, on Parkinson. Two other volumes contain a Synonymy of Plants, used by Goodyer, and the remains of a small Hortus Hyemalis in which ferns and mosses were preserved. Goodyer's miscellaneous papers quite bear out the high reputation in which he was held by his contemporaries—Johnson, Merrett, Parkinson, etc. They include dated descriptions of some 90 new or rare species of plants either collected by him or flowered in his gardens; early lists, of plants grown in the gardens of William Coys in Essex in 1616, which is, therefore, the second English garden-list known; of Franqueville, Gibbs, Parkinson, and probably in his own garden at Droxford, Hants, where he lived until he moved to Petersfield on his marriage. It is hoped that it may soon be possible to print this and much other personal detail relating to Goodyer and his contemporaries.

By the kindness of Mrs. Ruck-Keene, a portion of a deed relating to Goodyer's connection with a Bramshott property was also exhibited.

The President having commented on the interest of the communication, invited discussion.

Mr. C. C. Lacaita stated that his interest in John Goodyer dated from his own investigation into the history of the Jerusalem Artichoke. Goodyer was stated to be of "Mapledurham," which was not the Mapledurham on the Thames above Reading, nor Mapledurwell in Hampshire, but the Manor of Mapledurham near Petersfield in Sussex.

Dr. D. H. Scott, F.R.S., and Mr. James Britten having continued the discussion, the latter quoting from his investigations of the Sloane collections in the British Museum (Natural History), the General Secretary congratulated the author on his discovery that Mr. "Coel," Lobel's son in-law, was identical with Master James Cole, a London merchant mentioned by Gerard several times, always in commendation. The speaker had arrived at this conclusion some years previously, now confirmed by Goodyer's entries. He also pointed out that Lobel had another son-in-law, referred to as Ludovicus Myreus, apparently a London apothecary of repute, and named also by Clusius in his 'Exotica.' Thus Lobel must either have had two married daughters or a daughter who was twice married.

The second communication was by the General Secretary: "The benefits derived by Naturalists from the operations of the National Trust." He observed that upon the death of the Rev. Canon Hardwicke Drummond Rawnsley, on the 28th May, 1920, the subject occurred to him as eminently suitable for presentation to the Society, and was on the Agenda paper for the first meeting of the present session but was crowded out. He traced the history of the "National Trust for Places of Historic Interest or Natural

Beauty" from its foundation in 1894, with Canon Rawnsley as the Hon. Secretary until his death. With him were associated Sir Robert Hunter, Solicitor to the Post Office, and Miss Octavia Hill, and with these admirable helpers the course of the Trust has been clearly set out. The speaker pointed out that the influence of these three Councillors was marked by the acquisition of properties (*a*) in the Lake District due to the Canon, (*b*) Hindhead, due to Sir Robert Hunter, and (*c*) the view-points in Surrey and Kent, to Miss Octavia Hill.

A series of 90 slides of properties was shown on the screen, the majority taken for the Trust, with 15 lent by Prof. Oliver. Special emphasis was laid upon the value of Wicken Fen in Cambridgeshire and Blakeney Point in Norfolk, now preserved by the help of this association from human desecration and destruction. The speaker ended with an appeal for additional members to the Trust to ensure still greater advantages to the public.

Mr. S. H. Hamer (visitor), Secretary of the National Trust, observed that one of the most troublesome of their tasks was to teach the public how to use these natural reserves, and not to destroy plants thoughtlessly. He thanked the Society for this opportunity of making known the operations of the Trust.

March 17th, 1921.

Dr. A. Smith Woodward, F.R.S., President, in the Chair.

The Minutes of the General Meeting of the 3rd March, 1921, were read and confirmed.

The report of the Donations received since the last Meeting was laid before the Fellows, and the thanks of the Society to the several Donors were ordered, a special vote of thanks being accorded to Prof. C. S. Sargent, F.M.L.S., for his generous gift of eight volumes issued by the Arnold Arboretum, including "The Bradley Bibliography."

Dr. Nelson Annandale was admitted a Fellow.

Certificates in favour of John Hyacinth Power, F.Z.S., and George Tertius Dickson, were read for the second time.

John Francis Donald Tutt, F.Z.S., and James Robert Ainslie were proposed as Fellows.

The Certificates in favour of Prof. John Merle Coulter, Dr. Samuel Garman, Prof. Giovanni Battista Grassi, Prof. Louis

Alexandre Mangin, and Prof. Jean Massart as Foreign Members, were read for the second time.

The first paper, on "The Vertebrate Fauna of Houtman Abrolhos Islands, West Australia," by Mr. W. B. Alexander, communicated by Prof. W. J. Dakin, F.L.S., was epitomised by Prof. E. S. Goodrich, F.R.S., Sec.L.S.

A discussion followed, in which Sir Sidney Harmer, K.B.E., F.R.S., and Dr. N. Annandale took part, Prof. Goodrich replying.

The second paper was by Prof. Pierre Fauvel, "Annélides Polychètes de l'Archipel Houtman Abrolhos, recueillies par M. le Prof. W. J. Dakin, F.L.S.," and by whom the paper was communicated.

The next paper was by Mr. F. Chapman, A.L.S., "*Sherbornina*, a new genus of Fossil Foraminifera from Table Cape, Tasmania," which, like the previous paper, was read in title.

The last communication was by Miss E. L. Turner, F.L.S., entitled "Some Birds from Texel," and illustrated by a long series of lantern-slides from her own photographs. The author devoted most of her attention whilst on the island of Texel to the avocets, ruff and reeve, godwit, and two species of tern, describing the habits of the birds observed, especially during the nesting period. The last slide showed "the glory of the sandhills," the dwarf *Rosa pimpinellifolia*, L.

Dr. W. R. Parker enquired if Miss Turner had observed a parent bird teaching its young its appropriate note, as he had witnessed in the case of the Lesser Black-backed Gull.

Mr. H. J. H. Russell asked if the bird-reserve on Texel was maintained by the State or by private endeavour.

Dr. N. Annandale enquired as to the food of the birds described.

In reply, Miss Turner stated that the three bird-reserves in Texel were kept up by the private generosity of the Dutch, and not by the State, and she found that appeals for maintaining the efficiency of the reserves were readily responded to most liberally.

April 7th, 1921.

Dr. A. Smith Woodward, F.R.S., President, in the Chair.

The Minutes of the General Meeting of the 17th March, 1921, were read and confirmed.

The report of the Donations received since the last Meeting was laid before the Fellows, and the thanks of the Society to the several Donors were ordered.

Dr. Sadao Yoshida and Mr. Charles Coltman-Rogers were admitted Fellows.

James Walter White and Thomas Hayton Mawson were proposed as Fellows.

Certificates in favour of John Francis Donald Tutt and James Robert Ainslie were read for the second time.

Certificates for five Foreign Members, proposed on 3rd March, were read for the third time.

The first communication was by Mr. Horace W. Monckton, Treasurer and V.-P.L.S., entitled "On the Distribution of *Taraxacum erythrospermum*, Andrz., in the South-East of England."

The author explained that he had for some years noticed a small form of Dandelion with deeply cut leaves and red seed growing abundantly on a football ground at Wellington College, Berkshire. It belongs to a group of varieties named *erythrospermum*. The geological formation is Upper Bagshot Sand (Barton Beds). He had seen the same variety on the similar sandy soil of Puttenham Heath, Surrey (Lower Greensand), on the Thames Gravel near Old Windsor, Berks, and on walls at West Drayton and other places. It is not confined to areas of sand or gravel, for he exhibited specimens from the London Clay of Ashtead Common, near Epsom, Surrey. He had also found the same variety on the North Downs at Ranmore Common, near Dorking, which is in the Chalk District. The chalk does not, however, form the surface at that place, there being a covering of some thickness of clay, sand, and stones (mapped "Clay-with-Flints"). The only example of the red-seeded variety which he happened to have seen growing actually on a chalk soil was in a field between Leatherhead and Headley, Surrey. It is a larger plant than his other examples and is determined by Dr. Druce as *T. lacistophyllum*, Dahlst.

A discussion followed, Mr. C. E. Salmon, who showed specimens from the Chalk and Lower Greensand of the Reigate district, the General Secretary, Mr. C. C. Lacaita, Mr. A. J. Wilmott, and Mr. E. G. Baker taking part, Mr. Monckton replying.

Next followed Mr. Reginald A. Malby, who gave his lecture "A miniature Alpine Garden from January to December," illustrated by a long series of lantern-slides, many of them coloured.

Amongst the objects thus shown may be mentioned *Saxifraga Burseriana*, *S. Grisebachii*, *S. Stříbrnýi*, *S. longifolia*, *S. Cotyledon* var. *islandica*, *Anemone vernalis*, *A. sulphurea*, *Nymphœa Mooreana*, *Primula frondosa*, *P. denticulata*, *P. marginata*, *P. Juliæ*, *Iris sibirica*, *I. gracilipes*, *Campanula Allionii*, *C. pusilla*, *C. garganica*, *Shortia galacifolia*, *S. uniflora*, *Petrocallis pyrenaica*, *Crocus speciosus*, *Narcissus Johnstoni*, *N. monophyllus*, *N. triandrus*, *N. minimus*, *Oxalis enneaphylla*, and *O. lobata*.

Dr. A. B. Rendle, Mr. C. E. Salmon, Mr. T. A. Dymes, Mr. C. C. Lacaita, Mr. L. B. Hall, Mr. G. W. E. Loder, and Mr. H. N. Dixon put questions to the Lecturer, who answered as follows. The slides were hand-coloured with aniline dyes, the only difficulty being in blending the tints; he had grown *Alchemilla alpina* in his garden for some years, but had discarded it as not interesting him; his garden at Woodford was 75 feet long and 25 feet wide, but its surface was much increased by the digging and throwing up of banks for the alpine plants; the slides shown were the result of several years' work; Lumière slides were not found useful; and, that *Anemone sulphurea* throve with him when planted in a rooting space of two feet deep of decayed vegetable matter, with constant moisture and perfect drainage.

April 21st, 1921.

Dr. A. Smith Woodward, F.R.S., President, in the Chair.

The Minutes of the General Meeting of the 7th April, 1921, were read and confirmed.

The report of the Donations received since the last Meeting was laid before the Fellows, and the thanks of the Society to the several Donors were ordered.

Mr. Samuel Gordon Smith was admitted a Fellow.

Prof. Thomas Wibberley was proposed as a Fellow.

The Certificates in favour of Mr. James Walter White and Mr. Thomas Hayton Mawson as Fellows were read for the second time.

The Certificates in favour of the Foreign Members proposed on the 3rd March were read for the fourth time.

The election of Auditors was proposed from the Chair, and carried by show of hands as follows:—For the Council: Mr. G. W. E. Loder and Dr. E. J. Salisbury; for the Fellows: Mr. H. N. Ridley and Dr. W. T. Calman.

The President announced that there would be ballots for Fellows on the 5th May, and on the 2nd and 16th June.

Prof. R. Newstead, F.R.S., A.L.S., then delivered a lecture, entitled "Some Observations on the Natural History of the Upper Shiri River, Nyasaland." The Lecturer dealt with the common types of the flora and fauna of the Upper Shiri River. The flora was dealt with under three sections:—(1) The river and its banks, (2) the open "dambo" or savanna, and (3) the forest. As regards the flora of the river, attention was called to the plants forming the fringe of the sudd, namely *Pistia Stratiotes* and *Trapa bispinosa*. The width of the sudd in the river a little south of the lake Malombe was given as approximately thirty-seven yards on either side; the width, however, varied at different points. The banks of the river in places were clothed with a more or less dense vegetation, consisting of a few palms (species?), the Baobab (*Adansonia digitata*), *Kigelia* sp., with here and there the scarlet-flowered climber, *Combretum microphyllum*, etc. In the open dambo, during the dry season, the plants were nearly all resting. The commonest of the plants, however, was a species of *Asparagus* and an undetermined species of Leguminosæ. The forest proper is fringed on the river-side by Acacias of various species, of which flat-topped species predominated. Hereabouts the Candelabra, *Euphorbia grandidens* (?), was also very common. In the forest the tree most commonly met with was the Iron-wood, *Copaifera Mopane*. The Ebony (*Diospyros* spp.) was also fairly common, and so also was a species of *Parkia*.

Illustrations were shown of the giant climber, *Kickxia* sp., *Strophanthus Nicholsoni*, and *Adenium multiflorum*, the last-named plant being fairly common, and blossoming during the dry season.

In dealing with the insects, special reference was made to a highly protected species of Mantis (*Taracodes perloides*), and the common Tsetse-fly of the country (*Glossina morsitans*), the latter being the chief factor concerned in the dissemination of Sleeping Sickness in man.

Illustrations of the common Tree-frog, *Chiromantis xerampelina*, were shown, and attention was called to its highly protective colour and pattern.

Seventy-eight species of birds were collected; and specifically determined. Among these, was a new and undescribed species of flycatcher (*Erythrocercus nyasæ*); large flocks of the beautiful and rare little lorikeet, *Agapornis lilianæ*, were observed.

Photographs from life were shown of a large number of birds common to the region in question, supplemented by a collection of prepared bird-skins.

After the lecture, which was illustrated by a large number of lantern-slides, an animated discussion followed in which Lord Rothschild, Dr. A. B. Rendle, Sec.L.S., Lt.-Col. Tull Walsh, and Prof. E. S. Goodrich, Sec.L.S., took part. Replies to the various questions propounded were given by the lecturer, as to

whether infection could be carried by small mammals if the large ones were exterminated; the identity or difference between *Trypanosoma Brucei* and *T. rhodesiense*, the latter producing the worse attack; the sudd was generally marginal and attached, very rarely breaking off into detached islands loose in the stream; on the actual banks of the river, mosquitoes (*Mansonia uniformis*) abounded, but happily they did not travel inland.

May 5th, 1920.

Dr. A. Smith Woodward, F.R.S., President, in the Chair.

The Minutes of the General Meeting of the 21st April, 1921, were read and confirmed.

The report of the Donations received since the last Meeting was laid before the Fellows, and the thanks of the Society to the several Donors were ordered.

Capt. Bertram Hanmer Bunbury Symons-Jeune and Capt. Francis James Stayner were admitted Fellows.

Charles Taborn, F.R.H.S., and Walter Sydney Stevens were proposed as Fellows.

The following were submitted to the Ballot, and elected:—As Fellows: Arthur Mayfield, Mrs. Bella Dytes MacIntosh MacCullum, M.A., D.Sc. (N.Z.), William John Phillipps, Herbert Sutcliffe, A.R.C.S., Edward Jocelyn Wortley, M.B.E., F.C.S.; as Foreign Members: Prof. John Merle Coulter, Dr. Samuel Garman, Prof. Giovanni Battista Grassi, Prof. Louis Alexandre Mangin, and Prof. Jean Massart.

A vacancy in the list of Associates caused by the death of Robert Allen Rolfe was announced from the Chair.

Reports on collections from the Indian Ocean, for issue in the Society's 'Transactions,' Zoology, vol. xviii. at the cost of the Percy Sladen Trust, were read as follows, Nos. 2–9 being communicated by Prof. J. Stanley Gardiner, F.R.S., F.L.S.:—

1. Prof. A. Dendy, F.R.S., F.L.S.—On Hexactinellid Sponges.
2. Mr. C. G. Lamb.—Diptera: Asilidæ, Dolichopodidæ, etc.
3. Dr. Hugh Scott.—Coleoptera: Scydmænidæ, etc.
4. Mr. H. Gebien.—Coleoptera: Tenebrionidæ.
5. Dr. Max Bernhauer.—Coleoptera: Staphylinidæ.
6. Dr. Hugh Scott.—Coleoptera: Distribution of Staphylinidæ.
7. Mr. S. Schenkling.—Coleoptera: Cleridæ.
8. Miss F. E. Jarvis.—Hydroids of the Western Indian Ocean.
9. Dr. C. J. van der Horst.—Madreporaria: Agariciidæ.

Dr. Hugh Scott gave a *résumé* of Reports Nos. 2–7, and Prof. J. Stanley Gardiner summarized those of Miss Jarvis and Dr. van der Horst.

The President contributed further remarks upon the value and interest of the papers read.

Next followed a communication by Mr. E. R. Speyer on "Insects in Relation to the Reproduction of Coniferous Trees," instancing the destruction of the cones of *Pseudotsuga Douglasii*, Carr., *Pinus ponderosa*, Dougl., and *P. echinata*, Mill., by various insects, whose ravages were shown on lantern-slides.

Prof. Goodrich, F.R.S., Sec.L.S., and H. W. Monckton, V.-P. & Treas.L.S., made further remarks on the subject.

Prof. W. J. Dakin gave a comprehensive account of the expedition made under his leadership in 1913, of which some description is given in the Journal of the Society, Zoology, vol. xxxiv. (1919) pp. 127–180, and vol. xxxiiii. (1916) pp. 85–100. The vertebrates were enumerated by Mr. W. B. Alexander, and the Annelids by Prof. P. Fauvel, in papers laid before the Society on the 17th March last. To these were now added papers by Prof. S. J. Hickson, F.R.S., "On two Sea-pens," and by Dr. W. M. Tattersall on the "Amphipoda and Isopoda." Details regarding the latter papers were given by Prof. Dakin, who communicated them.

Prof. Dendy briefly commented on the results of the expedition.

May 24th, 1921.

Anniversary Meeting.

Dr. A. Smith Woodward, F.R.S., President, in the Chair.

The Minutes of the General Meeting of the 5th May, 1921, were read and confirmed.

Miss Winifred Mary Ailsa Lomas, B.Sc., and William Rae Sherriffs, M.A., D.Sc. (Aberd.), were proposed as Fellows.

Certificates in favour of Charles Taborn and Walter Sidney Stevens were read for the second time.

The Treasurer made his Annual Report on the Accounts of the Society, and the Statement (see pp. 26–28), duly audited, was received and adopted.

The General Secretary reported that since the last Anniversary the following had died or their deaths been ascertained, namely:—

21 Fellows.

John Gilbert Baker.
Francis Maule Campbell.
George William Carter.
Albert John Chalmers.
Frederick Moore Clements.
Herbert Henry Corbett.
James Ramsay Drummond.
Henry Duckworth.
Capt. Harold Stuart Ferguson.
Sir Charles Edward Fryer.
Peter Goiffon.
William Harris.
Rev. Manoah Holland.
Dr. George Blundell Longstaff.
Henry Felix Northcote.
Francis Edward Robotham.
Henry Frederick Conrad Sander.
John Symons.
William Alexander Talbot.
Rev. William Walter Watts.
Rev. Alexander Whyte.

2 Associates.

John Reader Jackson.
Robert Allen Rolfe.

4 Foreign Members.

Odoardo Beccari.
Yves Delage.
Alfred Gabriel Nathorst.
Otto Bütschli.

That the following 16 Fellows had withdrawn:—

John Redman Bovell.
Edmund Burke.
Capt. Malcolm Burr.
George Francis Scott Elliot.
Col. William Henry Wilson Elliot.
John Edward Griffith.
Rev. Albert Augustus Harland.
James Peter Hill.
Thomas Vere Hodgson.
Montagu Frank Hopson.
Rev. Edward Francis Linton.
Thomas Steel.
J. G. Otto Tepper.
John Augustus Voelcker.
Henry John Waddington.
George Herbert Wailes.

And that the Council had removed the following from the List, in accordance with the Bye-Laws, Chap. II. Sect. 6:—

Rev. Henry Bride Barber.
Charles Hall Betts.
Alfred Douglas Hardy.
Mrs. Maude Maufe.
Trailokya Nath Mukharji.
Miss E. M. Evered Parsons.
John Gervaise Turnbull.

During the same period 39 Fellows have been elected, of whom 34 have qualified up to the present. Also 5 Foreign Members have been elected.

The Librarian's report was read, showing that donations from private individuals and editors amounted to 107 volumes and 347 pamphlets and parts, by exchange 119 volumes and 682 detached parts, by purchase 64 volumes and 267 parts; in all, the accessions amounted to 290 volumes and 1296 pamphlets and separate parts.

Books bound amounted to 497: 4 in half-morocco, 47 in buckram, 183 in half-buckram, 142 in cloth, and 121 rebacked.

The General Secretary having read the Bye-laws governing the Elections, the President opened the business of the day, and the Fellows present proceeded to ballot.

The Ballot for the Council having been closed, the President appointed Dr. O. Stapf, Dr. J. R. Leeson, and Mr. A. W. Sheppard Scrutineers; and these, having examined the ballot-papers and cast up the votes, reported to the President, who declared the Council to be as follows:—

Prof. Margaret Benson, D.Sc.; *Prof. V. H. Blackman, F.R.S.; E. T. Browne, M.A.; Henry Bury, M.A.; Stanley Edwards, F.Z.S.; Prof. E. S. Goodrich, F.R.S.; *Dame Helen Gwynne-Vaughan, D.B.E.; *Sir Sidney F. Harmer, K.B.E., F.R.S.; Dr. B. Daydon Jackson; C. C. Lacaita, M.A.; Gerald W. E. Loder, M.A.; Horace W. Monckton, F.G.S.; Reginald I. Pocock, F.R.S.; *Capt. John Ramsbottom, M.A.; Dr. A. B. Rendle, F.R.S.; The Rt. Hon. Lionel Walter, Baron Rothschild, F.R.S.; Dr. E. J. Salisbury; Charles Edgar Salmon, Esq.; *Thomas A. Sprague, B.Sc.; and Dr. A. Smith Woodward, F.R.S.

(New Councillors are shown by an asterisk. The retiring Councillors were: Mr. E. G. Baker; Prof. J. B. Farmer, F.R.S.; Capt. A. W. Hill, F.R.S.; Miss A. Lorrain Smith; and Lt.-Col. J. H. Tull Walsh.)

The Ballot for the Officers having been closed, the President appointed the same Scrutineers; and these, having examined the Ballot-papers and cast up the votes, reported to the President, who declared the result as follows:—

President: Dr. Arthur Smith Woodward, F.R.S.

Treasurer: Horace W. Monckton, F.G.S.

Secretaries: Dr. B. Daydon Jackson.
Prof. E. S. Goodrich, F.R.S.
Dr. A. B. Rendle, F.R.S.

The President then delivered an Address entitled "Observations on some Extinct Elasmobranch Fishes," which was illustrated by many lantern-slides (see p. 29).

Treasurer's Accounts for the Year ended April 30th, 1921.

(Presented at the Anniversary Meeting, May 24th, 1921.)

Receipts and Payments of the Linnean Society from May 1st, 1920, to April 30th, 1921.

General Account.

Receipts.	£	s.	d.
Balance at Bankers on 1st May, 1920	152	0	4
Cash in hand do.	6	9	11
Interest on Investments	359	6	11
Admission Fees	252	0	0
Annual Contributions	2187	0	0
Sales of Publications:—			
Transactions £38 12 0			
Journals 180 10 4			
Proceedings and Catalogues 2 13 0			
	221	15	4
Fellows' postal account, deposits	13	16	10
Donations in aid of Publications	65	0	0
Miscellaneous Receipts	43	3	5
	£3300	12	9

Payments.	£	s.	d.
Taxes and Insurance	25	14	1
Repairs and Furniture (includes Committee Room, £99 2 7)	207	3	6
Coal, Electric Current, and Gas	102	17	3
Salaries	876	6	8
Library:—			
Books (New Books £40 12 8) £143 7 2			
Binding 183 13 9			
	327	0	11
Expenses of Publications:—			
Printing £765 6 4			
Illustrations 113 2 5			
Distribution 34 13 10			
	913	2	7
Miscellaneous Printing and Stationery	238	8	6
Petty Expenses (including Tea and Postage) £116 7 4			
Fellows' postal account 6 19 6			
	123	6	10
Linnean Medal	15	5	0
Balance at Bankers, 30th April, 1921 £355 8 2*			
Do. deposits, Fellows' postal account 108 8 4			
Cash in hand 7 10 11			
	471	7	5
	£3300	12	9

* Already allocated for printing in hand.

Separate Account.

	£	s.	d.	£	s.	d.
To Balance at Bankers, 1st May, 1920:—						
Westwood Fund	£	4	7			
Trail Award Fund	19	6	0			
Crisp Award Fund	20	9	8			
Hooker Lecture Fund	20	10	7			
Tagart Fund	18	5	7			
Goodenough Fund	42	16	11			
Library Catalogue Fund	1	1	0			
				122	14	4
,, Donations:—						
Goodenough Fund	£15	4	0			
Tagart Fund	6	0	0			
				21	4	0
,, Annual Dinner Fund Balance				4	0	6
,, Compounders Donation Fund				117	1	8
,, Interest on Investments:—						
Westwood Fund	£8	13	11			
Trail Award Fund	3	10	0			
Crisp Award Fund	6	6	4			
Hooker Lecture Fund	20	17	5			
Tagart Fund	20	5	7			
Goodenough Fund	3	9	0			
				63	2	3
				£328	2	9

	£	s.	d.	£	s.	d.
By Trail Award to Dame Helen Gwynne-Vaughan				16	10	0
,, Purchase and Binding of Books (Tagart Fund)				29	18	6
,, Contribution to General Account from Goodenough Fund				4	0	0
,, Purchase of £50 Victory Bonds 4 %:—						
Goodenough Fund				39	13	0
,, Balance at Bankers, 30th April, 1921:—						
Westwood Fund	£8	18	6			
Trail Award Fund	6	6	0			
Crisp Award Fund	26	16	0			
Hooker Lecture Fund	41	8	0			
Tagart Fund	14	12	8			
Goodenough Fund	17	16	11			
Library Catalogue Fund	1	1	0			
Annual Dinner Fund	4	0	6			
Compounders Donation Fund	117	1	8			
				238	1	3
				£328	2	9

Investments on April 30th, 1921.

General Account.

£	s.	d.			*Value, 30th April, 1921.* £	s.	d.
450	0	0	Forth Bridge Railway 4 per cent. Stock	@ 57½	258	15	0
1000	0	0	Metropolitan Consolidated 3 per cent. Stock	@ 64	640	0	0
1200	0	0	India 3 per cent Stock	@ 49	588	0	0
1000	0	0	Eastern Bengal Railway 4 per cent. Debenture Stock	@ 57½	575	0	0
1000	0	0	Great Western Railway 4 per cent. Debenture Stock	@ 69	690	0	0
300	0	0	Midland Railway 2½ per cent. Consolidated Perpetual Preference Stock	@ 38	114	0	0
3200	0	0	5 per cent. War Loan, 1929–47	@ 88	2816	0	0
					£5681	15	0

Separate Account: *Investments on April 30th*, 1921.

£	s.	d.				£	s.	d.
£870 9 5	232	5	0	Metropolitan Water Board 3 per cent. "B" Stock (Westwood Fund)	@ 54	125	8	4
	638	4	5	Ditto ditto (Hooker Lecture Fund)	@ 54	344	12	9
	100	0	0	New South Wales 3½ per cent. Stock, 1930-50 (Trail Award Fund)	@ 64	64	0	0
	252	18	0	2½ per cent. Consolidated Stock (Crisp Award Fund)	@ 47½	120	2	6
	530	0	0	East India Railway 3½ per cent. Debenture Stock (Tagart Fund)	@ 52½	278	5	0
£250 0 0	50	0	0	4 per cent. Victory Bonds..... (Westwood Fund)	@ 78½	196	5	0
	50	0	0	(Tagart Fund).....				
	50	0	0	(Hooker Lecture Fund)				
	100	0	0	(Goodenough Fund) ...				
						£1128	13	7

HORACE W. MONCKTON, *Treasurer*.

We have (in conjunction with the Professional Auditor, who certifies as to all details) audited the Accounts of the Society for the year ended 30th April, 1921, and found them correct. We have verified the Investments and Bank Balances.

Dated this 12th May, 1921.

W. B. KEEN, *Chartered Accountant*.

A. SMITH WOODWARD,
W. T. CALMAN,
G. W. E. LODER,
A. B. RENDLE,
H. N. RIDLEY,
E. J. SALISBURY,
} *Auditors*.

PRESIDENTIAL ADDRESS, 1921.

Observations on some Extinct Elasmobranch Fishes.

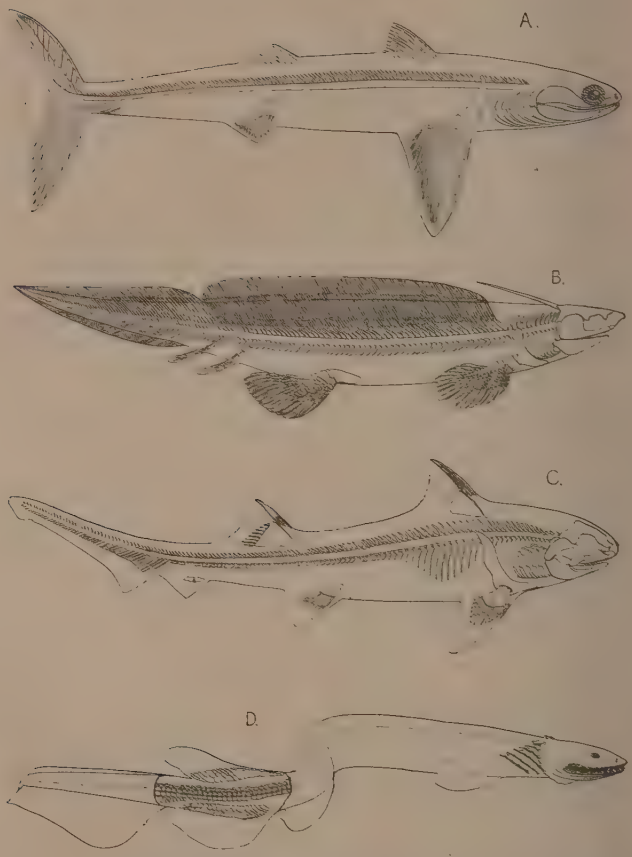
Linnæus was unfortunate in his treatment of the sharks, rays, and chimæras, which he ultimately removed from the class of fishes, and arranged among the reptiles as part of the order Amphibia Nantes. A little later the anatomists Cuvier, Johannes Müller, and others, by their more extended researches, first pointed out the true nature and relationships of these fishes; while in more recent years the morphologist, Carl Gegenbaur, and the embryologist, Francis Maitland Balfour, finally led to our modern conceptions of the group. The time has now arrived to test their conclusions by reference to the ancestral sharks and skates, of which the fossil remains have been discovered and studied in increasing numbers during the last three decades; and as I have had the opportunity of examining most of these discoveries, I propose briefly to discuss our present knowledge of the subject. So long as most of the extinct forms were represented only by isolated teeth and spines, it was impossible to determine satisfactorily their relationships, but now that many are known by at least parts of skeletons a detailed study of them is not in vain. The teeth and spines suggested to the early observers that since their first appearance in Silurian or Devonian times the sharks, rays, and chimæras had always remained much as they are at the present day, and could be quoted as remarkable instances of persistent types. Every advance in our knowledge of better-preserved fossils has tended to show that, like all other animals, these fishes have really evolved in many directions.

Pleuropterygii.

Leaving out of consideration the earliest shark-like fishes—the Acanthodians—which developed an unique exoskeleton and appear to have left no modern descendants, it may be said that the Devonian sharks of the order Pleuropterygii nearly realise our conception of the common ancestor. In the typical genus *Cladoselache* *, from the Upper Devonian Waverly Shales of Ohio, U.S.A. (fig. 1 A), the slender hyomandibular seems to have taken little part in the support of the jaws, which are of the primitive amphistylic type. The mouth is terminal, and the teeth, though arranged and reproduced as in the ordinary modern sharks, pass by insensible gradations of shape into the shagreen of the head. The notochord must have been persistent, and the cartilages of the arches, so far as they have been seen, are of diagrammatic

* B. Dean, Mem. Amer. Mus. Nat. Hist. vol. ix. (1909), pt. v.; Hussakof & Bryant, Bull. Buffalo Soc. Nat. Sci. vol. xii. (1918), p. 127.

Fig. 1.



Series of Successive Types of Elasmobranch Fishes. A. *Cladoselache*, typically Devonian, with fins supported by simple parallel rods of cartilage, the paired fins merely balancers (after Dean). B. *Pleuracanthus*, typically Permo-Carboniferous, with paired fins as paddles (after Fritsch). C. *Hybodus*, typically Jurassic, with paired fins for swimming, persistent notochord, and simple vertebral arches. D. *Chlamydoselache*, now existing, exemplifying the Cretaceous and Tertiary type, with cartilages pressed between the neurals and hæmals, and the supports of the fins more or less irregularly subdivided (after Garman).

simplicity. The membrane of the dorsal fin, though subdivided into two small remnants, is strengthened by simple parallel rods of cartilage, which were doubtless supported by similar rods between the muscles. The membranes of the paired fins are similarly strengthened by parallel rods, each with a corresponding support within the body-wall; but instead of being notched at the axil behind, they extend along the body and gradually taper backwards beyond the strengthened part. The paired fins are, in fact, obviously mere remnants of a once-continuous pair of folds. There is no ordinary anal fin, but Dr. Bashford Dean * has suggested that it may be represented by the pair of horizontal fin-folds, supported within the body-wall by rods of cartilage, occurring close to the base of the caudal fin, which is highly specialised and heterocercal. The slime-canal of the lateral line, as shown by the arrangement of the shagreen along its course, must have been an open groove. Still more interesting, some of the muscles and other soft parts are often preserved in the fossils, and Dr. Dean † has identified the kidneys, showing their microscopic structure, extending remarkably far back beyond the pelvic fins. The body-cavity and the alimentary canal must therefore have extended backwards as far as the end of the tail, thus fulfilling F. M. Balfour's prediction from embryology that this condition would eventually be found in primitive vertebrates.

The identification of the kidneys is especially important, because in one specimen of *Cladoselache kepleri* in the British Museum (no. P. 9269) they are displaced by crushing behind the pelvic fins in such a manner as to look like claspers appended to the fins. They have indeed been mistaken for these organs by Prof. O. Jaekel ‡, who has published a restored sketch of the fish, which is now unfortunately being copied in text-books. We have been able to make a microscope-section of a fragment of the fossilised tissue in the specimen in question, and both Dr. Dean and I are satisfied that it is kidney, not cartilage. There is no trace of a pelvic clasper in any Cladoselachid we have examined (we have seen nearly all the known specimens), and the only well-preserved pelvic fins end behind in a tapering membrane.

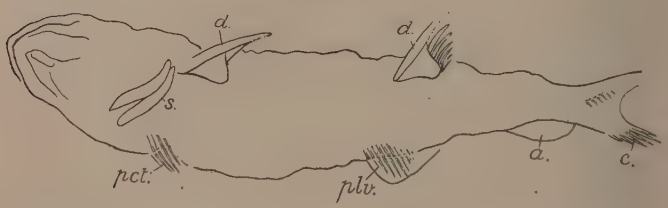
Prof. Jaekel's restored sketch just mentioned also embodies a theoretical interpretation of the pectoral fins, which still needs more evidence before it can be established. Apart from a few parallel bars, the supports of the pectoral fin within the body-wall have not hitherto been clearly seen in the specimens of *Cladoselache* from Ohio; but in one fragment of an obviously similar shark from the Lower Carboniferous of Scotland, described by Traquair §, the row of bars supporting the pectoral fin is continued backwards

* *Loc. cit.* (1909), p, 233.
† *Loc. cit.* (1909), p. 231, text-figs. 30, 31.
‡ Sitzungsb. k. preuss. Akad. Wiss., phys.-math. Cl. 1909, p. 715, fig. 6.
§ *Cladodus neilsoni*, R. H. Traquair, Trans. Geol. Soc. Glasgow, vol. xi. (1897), p. 41, pl. 4.

beyond the fin itself by a row of broad quadrangular cartilages. These may also have been retained within the body-wall, as a remnant of the support of a formerly extended fin-fold; or they may have begun to project outside the body-wall, as Jaekel represents them, to form the beginning of the paddle-shaped fin which we find in the next grade of sharks, the Ichthyotomi. I think that if they had already begun to enter into a movable paddle, they would have been sufficiently well calcified to be preserved in many specimens.

We have already noted that the dorsal fin of *Cladoselache* is subdivided without any essential modification of its primitive stiffening rods of cartilage. It is interesting now to add that a closely related genus, *Ctenacanthus*, equally generalised, has a spine, of the ordinary shark-pattern, in front of each dorsal fin. Dr. Dean * has described part of a well-preserved specimen from Ohio, and I have lately found that the nearly complete fish from the Lower Carboniferous of Scotland, named *Ctenacanthus costellatus* by Traquair†, is not a Cestracionť, as hitherto supposed, but a true Pleuropterygian. In the latter specimen (fig. 2), the simple tapering, parallel rods of cartilage strengthening the membrane are seen in both the pectoral and pelvic fins, and they are clearly supported by a corresponding series of parallel rods

Fig. 2.



Explanatory outline of the parts shown in the fossil *Ctenacanthus costellatus* from the Lower Carboniferous of Scotland, one-eighth nat. size. *a.* part of anal fin, displaced; *c.* caudal fin; *d.* dorsal fin with spine; *pct.* pectoral fin; *plv.* pelvic fin: *s.* cartilages of pectoral arch.

within the body-wall. Each dorsal fin-spine is supported by a triangular plate of cartilage between the muscles; but the membrane of each dorsal fin is strengthened by the usual simple tapering parallel rods, of which the foremost is much the largest and stoutest. There are no traces of an ordinary anal fin, but the area of shagreen-covered skin already noticed by Traquair as displaced beneath the caudal pedicle, probably represents the horizontal lateral dermal expansion which is so peculiar a feature

* *Loc. cit.* (1909), p. 249, pl. xxxiii. text-figs. 42–45.
† Geol. Mag. [3] vol. i. (1884), p. 3, pl. 2.

of *Cladoselache*. A row of broad cartilages among the obscure remains of the upper lobe, and the pointed ends of the cartilaginous rods in the lower lobe of the heterocercal caudal fin, are also suggestive of the corresponding structures in the tail of *Cladoselache*.

The powerful heterocercal caudal fin of *Cladoselache* and *Ctenacanthus* shows that these fishes were habitually free swimmers, not merely grovellers on the sea-bottom. The horizontally extended shape of the paired fins of the Pleuropterygii, therefore, cannot be explained as an adaptation to a life like that of the skates. The fins can indeed only be regarded as the little-altered remnants of primitive continuous folds, as already observed; and if the axial skeleton were sufficiently well calcified to be preserved in the fossils, the cartilaginous fin-supports would doubtless prove to be correlated in number with the vertebral arches.

Ichthyotomi.

The correlation just mentioned, which is postulated by our present theory of the primitive vertebrate, is actually seen in several well-preserved skeletons of the Carboniferous and Permian sharks of the order Ichthyotomi *. These were for long the most primitive Elasmobranchs known, but they exhibit an advance on the Pleuropterygii and approach the ordinary modern Selachii in the structure of the paired fins. The pectoral is a unibasal "crossopterygian" fin, which may easily have been derived, by concentration of the cartilaginous supports, from the polybasal Devonian type of fin, and I still think it may have passed into the dibasal or tribasal fin which is specially characteristic of the Selachians of later periods. The pelvic fin of the male bears the typical Selachian clasper. The only known Ichthyotomi (e. g., *Pleuracanthus*, fig. 1 B) are elongated fishes with a diphycercal tail, evidently bottom-dwellers, and the paddle-shaped pectoral fin was probably used as in the Dipnoan *Ceratodus*.

Like the Pleuropterygii, all the Ichthyotomi hitherto discovered have a persistent notochord without even the beginning of vertebral bodies. Hasse's determination † of ring-vertebræ in two specimens in the British Museum is based on mistaken observations: in the one case (no. 35015) the supposed vertebræ are the segments of the axis of a displaced pelvic fin, in the other case (no. 19665) the structures appear to be the bases of neural arches.

During recent years little has been added to our knowledge of the Ichthyotomi. I would, however, remark that a new chondrocranium from the Upper Devonian of Germany which may belong to a primitive shark ‡, seems to show symmetrical clefts in its

* See especially A. Fritsch, Fauna der Gaskohle Permform. Böhmens, vol. iii. pt. i. (1890).

† C. Hasse, Neues Jahrb. für Min. etc. 1883, vol. ii. p. 65.

‡ *Jagorina pandora*, O. Jaekel, Palæontol. Zeitschr. vol. iii. (1921), p. 217, text-figs. 1–3.

occipital region like those already noticed by Cope and others in the Pleuracanth skull. There is thus confirmation of the view that cranial cartilage sometimes became differentiated into separate parts before it was covered with membrane-bones.

Bradyodonti.

Among the earliest Elasmobranch fishes, there were many in which the teeth did not fall away from the edge of the mouth when they were discarded, as in all modern sharks and skates, but became fused with their successors into antero-posterior rows which were retained in some way outside or beneath the teeth actually in use. These rows, when completely preserved, exhibit all the successive teeth acquired during the lifetime of the individuals to which they belonged; and from them we learn that many of the Palæozoic sharks (e.g., *Campodus* and *Helicoprion*) had successional teeth as numerous and as rapidly-growing as in the familiar existing forms. Some rows, however, such as those of *Janassa* and the Cochliodonts, prove that there were also other sharks or skates in which the successional teeth were very few—not more than 7 or 8 during the whole lifetime and each one much larger than its predecessor. We know very little of these fishes beyond their teeth, but they seem to form a natural group intermediate between the primitive Elasmobranchs and the Chimæroids or Holocephali. From the slowness of their tooth-changes they may be named Bradyodonti.

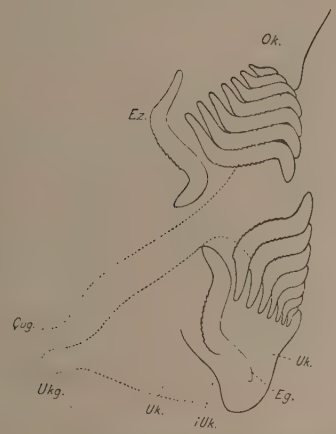
The typical family of the Bradyodonts is that of the Petalodontidæ, represented by several Carboniferous genera but best known by the Lower Permian *Janassa**. This is a skate-shaped fish, with paired fins which seem to have been on the ordinary Selachian plan. The teeth are arranged in 5 or 7 antero-posterior series, forming a powerful grinding pavement, chiefly on the symphysis, where the two rami at least of the lower jaw are firmly fused together. Only the latest row of teeth is in use at any time, the predecessors in the several antero-posterior series being piled up beneath the functional teeth to act as supports (fig. 3). From these piles we learn that during the greater part of its lifetime each individual *Janassa* had only 7 or 8 successional teeth. In the Lower Carboniferous *Climaxodus*†, the teeth from early youth to old age are spread in antero-posterior series as a pavement along a continually elongating symphysis of the jaw, and there are shown to be only 5 or 6 teeth in succession during the greater part of the individual life. Many of these teeth exhibit a conspicuous patch of much-hardened tubular dentine, very suggestive of the tritors on the dental plates of the Chimæroids.

The Carboniferous Psammodontidæ are known solely by the teeth of *Psammodus*, which are flattened grinders arranged in one

* O. Jaekel, Zeitschr. deutsch. geol. Gesell. vol. li. (1899), p. 259, pls. 14, 15.
† A. S. Woodward, Quart. Journ. Geol. Soc. vol. lxxv. (1920), p. 1, pl. 1.

paired series along the symphysis of the jaw. Each of these teeth is so much narrower in front than behind, that there must have been very few in succession during the individual lifetime. The dentine is coarsely tubular and uniform throughout the crown of the tooth. In very young individuals the teeth of the right and left sides are proved to differ a little in width; and in adult individuals all the teeth of one side, so far as known both in Europe and America, are very much wider than those of

Fig. 3.



Diagrammatic transverse section of jaws with teeth of *Janassa bituminosa* from the Lower Permian of Thuringia, about nat. size (after Jaekel). Six discarded successional teeth are seen resting beneath the tooth which is in use both in the upper (*Ok.*) and in the lower (*Uk.*) jaw; while another successional tooth, above (*Ez.*) and below (*Eg.*), is shown ready to come into place in due time. *Qug.* and *Ukg.* mark the articular ends of the jaws.

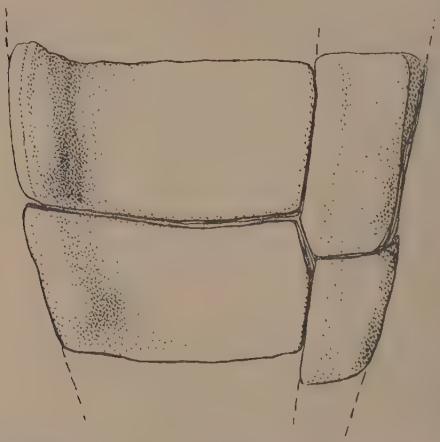
the other side. The dentition must therefore have exhibited the unusual asymmetry represented in fig. 4, and this asymmetry would be reversed in the two jaws.

The Upper Devonian and Carboniferous Copodontidæ, which are also known only by their teeth, seem to approach the Chimæroids more closely than the Psammodontidæ. In them the teeth are bilaterally symmetrical, arranged along the symphysis of the jaw in a single antero-posterior series, and embedded in a greater or less extended plate of highly vascular and softer dentine. The succession of these teeth in the typical Carboniferous genus *Copodus* is very difficult to understand; and in the

Upper Devonian genus *Acmoniodus* *, two of them, of very different shape and size, are seen embedded in a bilaterally-symmetrical pentagonal plate of the soft dentine already mentioned. The discovery of skeletons of the Copodontidæ will prove of great interest.

In the Carboniferous Cochliodontidæ the grinding or crushing teeth have the same structure as those of the other Bradyodonts, but they are arranged on the rami of the jaws as in the existing *Cestracion*. As first pointed out by Owen †, most of the antero-

Fig. 4.



Diagrammatic oral view of unsymmetrical paired series of teeth of *Psammodus rugosus*, from the Lower Carboniferous of Armagh, Ireland, about one-half nat. size.

posterior series of the teeth differ from those of *Cestracion* in being fused into continuous plates, each curving into a little scroll at the anterior or outer border. The components of these plates, however, have now been seen in many specimens which are marked by partially obliterated sutures, and it is clear that they were never more than 6 or 7 in number—thus very different from the long and rapid succession of teeth in the Cestraciontidæ. The Cochliodontidæ were indeed Bradyodonts. Nearly all the genera are known only by teeth, but the generalised *Helodus* is represented in the Ward Collection in the British Museum by several portions of skeletons. In these fossils there is no trace of the vertebral axis, which must have been notochordal.

* *Acmoniodus clarkei*, Hussakof & Bryant, Bull. Buffalo Soc. Nat. Sci. vol. xii. (1918), p. 151, pl. 55, fig. 3.

† Odontography (1840), p. 62.

The paired fins seem to resemble those of a modern Selachian, and the anterior dorsal fin is provided with a spine. The posterior dorsal fin seems to have been without a spine, as in the Chimæroids. In the highly specialised Cochliodont *Deltoptychius* * there are tuberculated spiny plates on the head, suggestive of some on the head of the earliest known typical Chimæroid *Myriacanthus*, which occurs in the English Lower Lias.

It may be added that the resemblance of the Cochliodont dentition to that of the Chimæroids has already been observed both by Owen † and Egerton ‡; and some of the Cochliodonts and Chimæroids have been grouped together by Jaekel § under the name of Trachyacanthidæ. The so-called teeth of Chimæroids from Devonian formations (e.g., *Ptychodus*) probably belong to fishes of a very distinct group.

Selachii.

Traquair's discovery of *Tristychius* ‖ in the Calciferous Sandstone of Eskdale, Dumfriesshire, shows that there were already ordinary sharks, with dibasal or tribasal pectoral fins and a normal tooth-succession, at the beginning of the Carboniferous period. Until Lower Jurassic times, all seem to have retained the persistent notochord; and the few well-preserved neural arches which have been seen are long and well separated, without any intercalary cartilages. Since then most of the true Selachii, as I term them, have acquired vertebral centra, and a consolidation of the neural arches with intercalated cartilages; most of them (including even the most primitive, like *Chlamydoselache*, fig. 1 D) also show various irregular fusions and subdivisions of the cartilage-supports of the fins. They have also evolved into more numerous families, and several parts of their skeleton have become specialised in different ways.

The Hybodonts (fig. 1 C), which for the most part exhibit the primitive notochordal condition until the Lower Cretaceous period, are especially interesting because, while their dentition and their general appearance resemble those of the existing Cestraciontidæ, their skull is very different and more closely agrees with that of the Notidanidæ ¶. They are indeed a generalised group from which several later families appear to have arisen, and they are the dominant sharks of the Jurassic and early Cretaceous periods. In Upper Jurassic rocks, however, we begin to find good evidence of several modern families of both

* A. S. Woodward, Proc. Geol. Soc. vol. lxxi. (1915), p. lxviii, text-fig. 2.

† Odontography (1840), p. 65.

‡ Quart. Journ. Geol. Soc. vol. xxviii. (1872), p. 236.

§ Sitzungsb. Ges. Naturf. Freunde, Berlin, 1890, p. 130; also *ibid.* 1891, p. 127.

‖ Geol. Mag. [3] vol. v. (1888), p. 83.

¶ A. S. Woodward, Foss. Fishes Weald. & Purb. Form. (Mon. Palæont. Soc. 1916), p. 6, text-fig. 3.

sharks and skates, and some of the fossils are essentially identical with forms living at the present day. The Cestraciontidæ, Notidanidæ, Scylliidæ, Squatinidæ, and Rhinobatidæ, of which fine skeletons are known from the Lithographic Stone of Germany, were certainly already differentiated in Upper Jurassic times. The Spinacidæ were also nearly in existence, one fish having been found which is only distinguished from the Spinacidæ by retaining a small anal fin *.

The typically modern sharks of the family Lamnidæ did not appear until the Cretaceous period, and were not abundant until the time when the Chalk formation was deposited. The Carchariidæ arose even later, and their remains are not known from rocks earlier than the Tertiary. The great skates also began to be differentiated towards the end of the Cretaceous period, and by the beginning of the Tertiary they were almost the same as in existing seas, only with a different geographical distribution.

Of progressive specialisations of certain skeletal structures which can be followed among the fossils, perhaps the most interesting is the evolution of the rostrum in the saw-fishes or Pristidæ. We have already seen that Rhinobatidæ occur in the Upper Jurassic. *Rhinobatus*-like fishes in the Upper Cretaceous of the Lebanon, begin to have the rostrum elongated and strengthened, and fringed with a row of sharp enamelled teeth loosely fixed along each lateral edge †. *Onchopristis* ‡, from the Upper Cretaceous of Egypt, and *Onchosaurus* §, from many Cretaceous formations, have these rostral teeth larger and barbed at the apex, with a tendency to reduction of the enamel. *Propristis* ‖, from the Lower Eocene of Africa, has a still longer stiffened rostrum, with the lateral teeth peg-shaped, loosely fixed in very shallow sockets, and with scarcely any trace of enamel. The modern *Pristis*, which ranges from the Middle Eocene onwards, has the peg-shaped rostral teeth sunk in deep sockets of cartilage. In the early stages of the development of the rostral weapon there was thus much variety; in the latest stage there is only one form.

This tolerably complete history of the Pristid rostrum, which has only lately been discovered, is an illustration of the help afforded by the fossilised extinct Elasmobranchs in understanding the isolated survivors of the Subclass at the present day. Nearly every addition to our knowledge of the fossils during recent years, indeed, has helped to fill gaps in the series; and researches

* *Protospinax annectens*, A. S. Woodward, Proc. Zool. Soc. 1918 (1919), p. 233, pl. 1. figs. 2, 3.

† *Sclerorhynchus atavus*, A. S. Woodward, Catal. Foss. Fishes Brit. Mus. pt. i. (1889), p. 76, pl. 3. fig. 1, and Proc. Zool. Soc. 1889, p. 449. See also O. P. Hay, Bull. Amer. Mus. Nat. Hist. vol. xix. (1903), p. 398.

‡ E. Stromer, Abhandl. k. bay. Akad. Wiss., math.-phys. Cl. vol. xxviii. Abh. 8 (1917), p. 12, pl. 1.

§ E. Stromer, *loc. cit.* (1917), p. 11.

‖ E. Fraas, Neues Jahrb. für Min., etc., 1907, vol. i. p. 1, pl. 1.

like those of Regan * on the general morphology, and of Ridewood † on the axial skeleton of existing groups, are enhanced in value by the contributions made by palæontology. We have seen that the earliest known Elasmobranchs almost realise the ancestral vertebrate type as now conceived. Very soon the remnants of lateral fin-folds, which must have acted merely as two pairs of balancers in these fishes, concentrated into paddles, and these again passed into stout-based fins adapted for swimming. After this advance, the upper jaw-cartilages, which had already been supported by contact with the postorbital region of the skull, gradually assumed a firmer connection with its base in the Bradyodonts which eventually became Chimæroids, while they lost their direct support in nearly all the modern sharks and skates which depend on the hyomandibular and a ligament for jaw-suspension. After the differentiation of the jaws, vertebral centra began to appear, and finally there were additional growths and various fusions of cartilages which led to the diversity in the Elasmobranch skeleton observed to-day. Fossils are gradually adding to our knowledge of the successive stages through which this ultimate diversity arose, and we may hope soon to be able to trace most groups of sharks and skates backwards to their generalised common ancestors.

Mr. Percy Thompson then moved:—"That the President be thanked for his excellent address, and that he be requested to allow it to be printed and circulated amongst the Fellows," which, after being seconded by Mr. J. C. Shenstone, was put and carried by acclamation.

The President having acknowledged the Vote of Thanks, proceeded to address Dr. Dukinfield Henry Scott, F.R.S., reciting his services to Botany and handing to him the Linnean Gold Medal. He said:—

Dr. Scott,—

The Council of the Linnean Society desires to express its appreciation of your numerous and valuable contributions to botanical science by awarding to you the Linnean Medal, the highest distinction in its power to bestow. Since your first paper on the development of articulated laticiferous vessels, written 40 years ago, you have continued to devote yourself to structural botany with unflagging zeal, and your published memoirs are models both for the exposition of new facts and for the concise statement of morphological conclusions. Your early researches soon brought you into association with the late Prof. W. C. Williamson, whose pioneer work on the structure of the petrified plants found in certain coal-seams was attracting wide

* Proc. Zool. Soc. 1906, pp. 722–758, with figs.
† Phil. Trans. vol. 210 B (1921), pp. 311–407.

attention among botanists; and from 1893 onwards you have taken a foremost place in advancing our knowledge of the later Palæozoic flora. You began by co-operating with Prof. Williamson in three important memoirs on the Calamites and on *Lyginodendron*, published in the 'Philosophical Transactions,' for 1895; and after his death in that year you continued alone to add other memoirs to the same series. In your account of the Sphenophyllales, you described *Sphenophyllum fertile*, a new form of fructification, and also *Cheirostrobus*, a remarkable cone to be regarded as the type of a new family. Your memoir on *Lepidocarpon* afforded the final proof that some Lycopodiaceous plants in the coal-period developed seed-like bodies, and you made another valuable contribution to our knowledge of lycopod fructification by your description of *Spencerites*. Among the Pteridosperms, you were the first to recognise a species of *Medullosa* from British Carboniferous rocks, and your descriptions both of that genus and *Heterangium*, and of the new genus *Sutcliffia*, made fundamental advances. You also joined Prof. F. W. Oliver in an exhaustive study of *Lagenostoma* which established its reference to *Lyginodendron*. Among your numerous contributions to our knowledge of primitive ferns, your discovery of *Botrichioxylon*, with its secondary wood, is memorable; and you were the first to find germinating spores in *Stauropteris*. In other memoirs you have described the stem-structure of the Cycadofilices and Cordaitales, particularly *Calamopitys*, *Mesoxylon*, and *Pitys*. Your researches, indeed, have thrown light on the phylogeny and relationships of almost every group of Carboniferous plants, and your joint work with Prof. E. C. Jeffery on *Stereopteris*, *Archæopitys*, and other plants from the Waverly Shales of Kentucky, deals with some of their immediate ancestors.

While actively engaged in research yourself, you have also stimulated others to follow your example. As Assistant Professor first at University College, then at the Royal College of Science, and afterwards as Honorary Keeper of the Jodrell Laboratory at Kew, you were able to exert personal influence. In 1884 you and Prof. Bower published a useful translation of de Bary's "Comparative Anatomy of the Vegetative Organs of the Phanerogams and Ferns"; in 1888 you helped to revise Huxley and Martin's well-known "Practical Biology"; while in 1894 and 1896 you reached a still wider circle of students by the two parts of your admirable "Introduction to Structural Botany." In 1900 you published the first edition of your "Studies in Fossil Botany," which has become a classic and is now being issued in a third edition. In 1908 you revised the English translation of Solereder's "Systematic Anatomy of the Dicotyledons," and in 1911 you wrote a little book which has fascinated many of us, "The Evolution of Plants." Since 1893 you have also promoted botanical science by editing the 'Annals of Botany.'

Finally, the Linnean Society remembers with gratitude your long and devoted service as member of Council, as Secretary, and

as President. I know it eagerly endorses the action of the Council in offering you this mark of its admiration and esteem; and as one who has long enjoyed both your friendship and your scientific comradeship, it gives me the greatest pleasure to be the means of conveying the Medal to you.

The recipient made a suitable reply.

The General Secretary having laid on the table certain obituary notices, the proceedings terminated.

OBITUARY NOTICES.

For several years past our Meetings have missed the presence of the veteran botanist, JOHN GILBERT BAKER, who, in the memory of many of us, was at one time an assiduous frequenter of these rooms, and an indefatigable contributor to our publications.

Born at Guisborough, Yorkshire, on the 13th January, 1834, he was only eight months old when his parents, John Baker and his wife Mary Gilbert, removed to Thirsk, where our late Fellow's early boyhood was passed. In 1843 he was placed at the Friends' School at Ackworth, and there began to show his bent by making a collection of local plants. Three years later he was transferred to the Friends' School at Bootham, York, already known for its vigorous development in natural history study. In his fourteenth year Baker was awarded the annual prize for his collection of botanical specimens, and became curator of the school herbarium.

In the autumn of 1847 Baker quitted school to help his father in business, and for the next eighteen years he was busy in Thirsk, but without abandoning his love for plants. In 1849 he contributed a paragraph to the 'Phytologist,' iii. p. 738, on the occurrence of *Carex Persoonii* in the north-east of Yorkshire. He collaborated with John Nowell in a supplement to Baines's 'Flora of Yorkshire,' which came out in 1854, and the next year saw the issue of a pamphlet on British plants classified according to their geognostic relations. In 1859 he became Curator and Secretary of the Thirsk Botanical Exchange, which has preserved its existence and now is known as the Botanical Exchange Club and Society, which came south about the same time as our late Fellow. Amongst Baker's friends were Daniel Oliver, then known as 'tertius,' a young Northumbrian botanist, who, four years his senior, had in 1858 been installed by Sir William Hooker as Librarian at the Royal Gardens, Kew.

The year 1863 witnessed the publication of Baker's first important work, 'North Yorkshire,' a volume of nearly 400 pages,

with maps, and an expansion of the views put on record in the 1855 tract; it was printed at Thirsk, where the bulk of it was stored on the author's business premises, when a fire in 1864, due to the carelessness of a passer-by, destroyed the house and contents, including his own herbarium and botanical library. He had in August 1860 married Hannah Unthank, and their first-born, Edmund Gilbert, an infant born on the 9th February, 1864, was carried out to safety.

The sympathy of his large circle of botanical and other friends made good, in part, his botanical losses, though the stock of his 'North Yorkshire' could not be replaced. But Baker's future life was determined by this accident; in the same year he had published in the 'Naturalist' for 1864 a revision of the British Roses, which even drew attention on the part of foreign botanists; in 1865 he printed a monograph of British Mints in the 'Journal of Botany.' In 1862 Mrs. Borrer had given to Kew the whole of her late husband's herbarium, and the incorporation of a certain portion was needed for the Director's immediate work. Sir W. Hooker had noted the excellence of Baker's work on Roses, and also his increasing inclination to the study of ferns in the Club reports; the invitation to this was sent, but in August 1865 Sir W. Hooker died at the age of 80. Among the unpublished material left by the veteran was the unfinished MS. of the 'Synopsis Filicum,' the preface, and proofs of the first three sheets. The new Director's hands were full of executive work, and the completion of the 'Synopsis' could only be done at Kew. This involved the creation of a new post, which was arranged thus. In 1861 Oliver, already mentioned as the Librarian at Kew, had been allowed to augment his stipend by accepting the Chair of Botany at University College, vacated by Dr. John Lindley due to failing health, and in 1864 by the Keeper of the Herbarium, A. A. Black, resigning that post to seek health in a warmer climate. The Keepership and Librarianship were then amalgamated, and the Assistant Directorship lapsed when the younger Hooker succeeded his father. The post of First Assistant was confirmed on the 1st April, 1866, Baker having taken up his duties in anticipation on the 1st of January in that year. On the 5th of April, five days after the official confirmation of his new appointment, he was elected a Fellow of our Society.

Soon after he was thus permanently settled in his new appointment, he was permitted to follow the example of his chief and add to his income outside. Thus from 1869 to 1881 he was lecturer on botany at the London Hospital Medical School; in 1874 one of the lecturers to young gardeners at Kew, which he retained till 1904, five years after he had retired from office; also lecturer at the Chelsea Physic Garden from 1882 to 1896.

When Prof. D. Oliver retired at sixty years of age, Baker was promoted to the vacant office on 1st June, 1890, which he held until he himself reached the age of 65 in 1899. On leaving office

he still utilized the herbarium and garden, and though gradually his physical strength failed, he retained possession of his mental powers to the end. He died at Kew on 16th August, 1920, in his 89th year, and was buried on the following Thursday, 19th August, in the Friends' Burial Ground, London Road, Isleworth.

Baker's work after his arrival at Kew was prodigious, largely due to the fact that he concentrated his attention upon families which did not need the help of the microscope to describe them. Mr. George Bentham more than once said to the present writer that "Baker never soaks a flower." Yet Baker's astounding output was accomplished in a quiet manner, entirely devoid of fuss or the visible hurry plainly shown by his chief (Proc. Linn. Soc. 1916–17, p. 56). No doubt the secret lay in the large amount of time spent in work at home after official hours; he really lived for systematic botany.

The 'Synopsis Filicum' has already been mentioned; it came out in 1868, reaching a second edition in 1874, and he was at once looked upon as a leading author upon vascular cryptogams, leading to his being engaged on the ferns for the great Brazilian Flora (1870). But even before the 'Synopsis' appeared, Baker had printed a list of cultivated Selaginellas in the 'Gardeners' Chronicle' for 1867, a medium which brought out no inconsiderable part of his pioneer work for cultivated plants. A revision of *Narcissus* came out in the 'Journal of Botany' in 1870, which was reshaped in 1875 as part of Burbidge's 'Narcissus' volume. Baker was also busy for Oliver's 'Flora of Tropical Africa,' elaborating for the first volume in 1868 the Ampelideæ, Sapindaceæ, and Connaraceæ, and in the second (1871) the whole of the Papilionaceæ, 257 pages, nearly one-half of that volume, and in the third (1877) the small families of Myrsineæ and Sapotaceæ. In the same year as the 'Synopsis' appeared Baker was responsible for the official catalogue of the ferns cultivated at Kew. Mr. Wilson Saunders, of Reigate, was printing his 'Refugium botanicum,' plates and descriptions of interesting but not showy plants, and Baker contributed to the five volumes from 1869 to 1873; and from 1870 to 1875 he helped in editing the 'Journal of Botany,' in which so many of his shorter essays appeared. He gave an account of Yuccas in the 'Gardeners' Chronicle' for 1870, and in the same autumn he had his "Geographical Distribution of Ferns" printed in the Transactions of our Society, and in our Journal for the next year he produced his "Monograph of British Roses."

Baker's publications from this period onwards became so frequent and many that the writer must summarize them after alluding to the volumes he wrote. 'Elementary Lessons in Botanical Geography' (1875); the 'Flora of Mauritius and the Seychelles' (1877); Compositæ (1873–1884), Connaraceæ, and Ampelideæ (both in 1871) for Martius's 'Flora Brasiliensis'; 'A Flora of the English Lake District' (1885); 'Handbook of the Fern Allies' (1887); 'Handbook of the Bromeliaceæ' (1889); 'A summary of the new Ferns . . . since 1874' (Oxford, 1892);

'Handbook of the Irideæ' (1892); and with G. R. Tate, 'A New Flora of Northumberland and Durham' (Newcastle-on-Tyne, 1868). As to Colonial floras, he continued to co-operate on them; to the 'Flora of Tropical Africa,' 'Flora Capensis,' and 'Flora of British India' (Leguminosæ, vol. ii. pp. 56–306) he contributed valuable portions. To our own Journal, besides the "Monograph of British Roses" spoken of above, he sent revisions of Liliaceæ, Scilleæ, and Chlorogaleæ, Tulipeæ, Asparagaceæ, "Systema Iridearum" (in our 16th volume), Hypoxidaceæ, Colchicaceæ, Aloineæ, and Yuccoideæ, the tuber-bearing Solanums, and many papers of new species from Madagascar. In the 'Journal of Botany' we may note "Dactyloid Saxifrages" (1870), a Monograph of *Xiphion* (1871), Cape Species of *Anthericum* (1872), *Aechmea* (1879), *Isoëtes* (1880), *Pitcairnia* (1881), *Selaginella* (1884), and Tillandsiæ (1887–88). Amongst his many contributions to the 'Gardeners' Chronicle' were these:—Yuccas (1870); all known Lilies (1871); *Crocus* (1873); *Iris* (1876); *Agave* (1877); *Aquilegia* (1878); Hardy Sempervivums (1879); *Crinum* (1881); *Cyclamen* (1883); Cultivated Asters (1884); New Garden Plants, a running series from 1888 to 1892.

The "North Yorkshire" was reprinted in the Transactions of the Yorkshire Naturalists' Union, re-issued in 1906.

The last contribution in our Journal is "A Revised Classification of Roses, 1905," printed in vol. xxxvii. pp. 70–79, in some degree a forerunner of his descriptions in Miss Willmott's volumes "The genus *Rosa*," 1910–14.

Our Linnean Medal was presented to John Gilbert Baker in 1899; he was elected F.R.S. in 1878; the Victoria Medal of Honour was awarded by the Royal Horticultural Society in 1897, who appointed him an Honorary Life Fellow in 1888; lastly, in 1919 the University of Leeds conferred upon him the Honorary Degree of D.Sc.

His character is admirably summed up by Sir David Prain, whose words we are permitted to add.

"The sense of proportion which rendered Baker so distinguished as a systematic writer made him equally effective as a teacher. . . His style was lucid and concise, while he possessed the happy gift of ability to emphasize the salient features of his subject without neglecting its details. Baker's published works ensure the perpetuation of his memory as the last of a singularly gifted circle of systematic botanists. While any of them survive, those who worked with or were taught by Baker will cherish the recollection of one of the kindest and best of men." [B. D. J.]

Francis Maule Campbell, who was born at Edmonton, Middlesex, in August 1843, and baptised on the 1st of September in that year, died in his sleep at Nutfield, Surrey, on 31st December, 1920. He was but little known to most of our Fellows since his retirement to Wales and his marriage in 1902, but before that he

was frequent in his attendance at our meetings, and occasionally exhibited specimens of Arachnida, which he specially studied. In our own publications are to be found papers on *Tegenaria*, the House-spider—its cocoon, glands in its maxillæ, parthenogenesis, and the pairing of the species; stridulating organs in *Steatoda* and *Linyphia*; on the flight of Dragonflies and the Humming-bird Hawk-moth; these extended from 1880 to 1883. Upon his election on the 19th December, 1878, he was living at Rose Hill, Hoddesdon, and in February 1886 was chosen as President of the Herts Natural History Society, serving the customary two years, and at the successive Anniversary Meetings in 1887 and 1888 delivering an address, the first being on 'The Means of Protection possessed by Plants,' suggested by the recent issue of R. A. Prior's 'Flora of Hertfordshire,' and the second on 'Structural Variations in the Eyes of Animals in reference to their Function'—both printed in the fifth volume of that Society's Transactions. Other papers written by him on 'Instinct,' 'Habits and Economy of our Social Wasps,' 'The Russian Fly,' and 'A White Stoat at Hoddesdon,' from 1886 to 1892, are also in the Transactions of the Herts Society.

In 1902 he married a Welsh lady and removed to Bryullwydwyn, near Machynlleth, in Montgomeryshire, where he remained till 1919, when, having become a widower, he removed to South Nutfield, Surrey, and after some months he married again, passing away, as previously stated, on the last day of 1920. He was also a Fellow of the Zoological, Entomological, and Royal Microscopical Societies. [B. D. J.]

Frederick Moore Clements was born in England, but being of a roving disposition, he travelled in Central Africa, there meeting Mr. F. O. Selous, and finally settled at Sydney, New South Wales. He was successful in pharmacy and had a good knowledge of medicinal plants; he cultivated many of them in a large and beautiful garden a short distance outside Sydney, where also he had an aviary containing several hundreds of native and foreign birds. He gave liberally to patriotic objects—£1000 on "Australia Day" and £500 on "Belgium Day." His valuable library was bequeathed in great part to the Linnean Society of New South Wales. In his will he directed that many charities in England should benefit, especially the parish of Clun, in Shropshire, where the poor were to receive certain gifts every Christmas. He was elected Fellow of our Society on the 1st March, 1917, and died at his house, "Brahea" at Stanmore, on the outskirts of Sydney, on the 17th August, 1920, and was buried two days later at the Waverley Cemetery.

About two years ago he printed and distributed a little pamphlet, 'Some Faces and Places of Clem,' a characteristic product of the man; it contains a catalogue of the plants in his garden, amounting to nearly 800 names. [B. D. J.]

The death of HERBERT HENRY CORBETT, who died at Doncaster on the 5th of January last, had this additional element of pathos in that, elected last year to the Presidency of the Yorkshire Naturalists' Union, it was too recent for his assumption of its functions before his death.

He was born at "Broxups," the house near Besses o' th' Barn, between Bury and Manchester; when five years of age the family removed to Cheadle Hulme. His education was received at Dr. Keyworth's school at Alderley Edge, and later at Owens College, Manchester. For a short time he was in his father's office in Manchester, but the profession of an architect and surveyor did not satisfy him, and he returned to Owens College to study medicine. After passing his examination he deputised for various medical men at Bolton, Whaley Bridge, and Cheadle, settling finally at Doncaster in 1888, succeeding to the practice of Dr. Wadsworth. Later he became a homeopathist, probably through the influence of the Capper family in Liverpool; he married Jessie Capper in 1892, the daughter of a distinguished entomologist, and the union was a congenial and happy one. Their home became a meeting place for naturalists and a centre for new activity in the Doncaster Scientific Society, with increased membership and a systematic exploration of the local flora and fauna; he filled the office of Secretary and then President for several years, and it was largely due to the influence of our late Fellow that the Municipal Museum was established, which, from modest beginnings, grew to the purchase of a suitable building for display and future extension. As the first Curator he had the task of arranging the exhibits, and during the absence on service of the present Curator, he reassumed his old functions. His local collection of Coleoptera is housed in the Museum.

On the outbreak of the great war, his only son Vincent volunteered for service, was wounded and spent some months at home recovering; he rejoined, but in October 1918, shortly before the Armistice, he was killed in action. This, added to the loss of his wife, six months earlier, made an indelible mark, and the subject of our remarks thereafter devoted his life to his three daughters, who survive him. On the 5th March, 1919, he was elected Fellow of the Entomological Society, and the next day Fellow of the Linnean Society, being formally admitted to the latter on the 5th June following, the last occasion when the present writer saw his friend of nearly forty years' standing. At the annual meeting of the Yorkshire Naturalists' Union at Bradford, 9th December, 1920, he was elected President for the ensuing year, and accepted the position with great pleasure, which gave great satisfaction to the members of the Union. At the moment of election he was staying at Broadstairs, recovering from a severe operation, returned home, seemingly much the better for his stay in Kent, and expressed himself feeling almost as well as ever in his life. On the 2nd January, 1921, however, the old

trouble made itself felt again, with a second operation, from which he failed to recover, and died, as mentioned previously, five days after becoming the President of the Yorkshire Naturalists' Union, and was buried in Doncaster Cemetery on the 8th of January last.

From early life he had been devoted to Lepidoptera, especially the smaller species, and his first paper came out in 'The Entomologist' for 1876, when the author was 19; and during his subsequent career his pen was busy in recording local observations. Interwoven with an intimate and sympathetic account of Mr. Corbett's life, will be found an ample statement of the entomological labours of our late Fellow, by Mr. E. G. Barford, in 'The Naturalist' for April last (pp. 145–149), with a portrait.

[B. D. J.]

James Ramsay Drummond, B.A. (Oxon), was born at sea, off the coast of Madras, on the 25th May, 1851. Having been educated at Edinburgh, Glasgow, and Oxford, he joined the Indian Civil Service in 1874. He served in the Punjab as Assistant Commissioner, District Judge, and Deputy Commissioner until 1905, when he retired. Before leaving India he acted for a short time for the Curator of the Botanic Garden at Calcutta, who was then absent on leave. After his return to England he lived first at Kew and then at North Acton, where he died rather unexpectedly on April 11th of the present year. He was cremated at Golders Green, whence the ashes were taken to Scotland.

J. R. Drummond was a nephew of the two great plant collectors, James and Thomas Drummond, who contributed so largely to our knowledge of the floras of West Australia and North-west America respectively, and shared with them in the common heritage of love of plants and enthusiasm for botany. He himself collected largely in the Western Punjab, whose flora he knew intimately, and only to a lesser extent in the neighbourhood of Dalhousie and Simla, and in the Upper Gangetic plain, besides employing native collectors in various parts of the Western Himalaya. He intended to write a Flora of the Punjab, but, partly owing to enfeebled health, he was unable to carry out the plan on which he had set his heart. He had an unusually discriminative eye and a remarkable memory which aided him very much in any of the many problems he set himself to work out. Unfortunately only few of them matured into publication. But, whether he made personal use of those gifts or not, he was always ready to place them, as well as his linguistic knowledge and general versatility, unstintedly at the disposal of others. He was equally liberal in the distribution of his collections, which were intended for the great botanical herbaria at home and abroad, and of which he actually distributed the first sets before the war.

[O. Stapf.]

Capt. Harold Stuart Ferguson, M.B.E., who died on the 5th of January last in his seventieth year, was the son of a well-known London physician of the early Victorian days. Educated at Eton, and for a short time at Wimbledon, he passed into Woolwich Academy, and in due course obtained a commission in the Royal Artillery. After four or five years in the Service, he resigned his commission and proceeded to India to take up coffee-planting. In 1880 he was offered and accepted the post of English tutor to the three Princes of Travancore, and when they no longer required his tutelage he was appointed second in command of the Nair Brigade of native troops maintained by the Maharajah of Travancore. A few years later, while at home on leave, he married Isabel Julia, daughter of Col. Hamilton Maxwell of the Indian Staff Corps, and niece of Lady Roberts. Returning to India, he held various appointments under the Travancore Government, including that of Director of the Public Museums and Government Gardens at Trevandrum. There his great love for wild creatures showed itself in the care bestowed on the condition of the birds and animals kept in the Gardens. At the same time his collectors continually brought in rare specimens of birds, animals, and plants. Retiring from India in 1904, he settled at Ascot and became one of the private secretaries of Lord Roberts, V.C., but on the death of that distinguished soldier he moved to London and took up war-work. While his three sons were fighting for their country, he was engaged daily at the Headquarters of the London Rifle Brigade till the disease, which eventually proved fatal to him, obliged him to stop work.

Capt. Ferguson always took a great interest in the birds and animals of the part of India where he was stationed, and in 1902 he published in the 'Journal of the Bombay Natural History Society' an account of the birds of Travancore. On 4th June, 1891, he was elected a Fellow of the Linnean Society. On his retirement from India he became a constant visitor to the Zoological Gardens at Regent's Park, and before he died he was nominated a Member of the Council of that Society.

Before he went to India he played cricket for the M.C.C., I Zingari, and Eton Ramblers, and was a member of the M.C.C., Surrey County Club, and National Sporting Club. He obtained his International cap as an Association football player, and was selected to represent Scotland against England at Rugby football, but could not play as he was sailing for India.

His long jump of 21 ft. 2½ in. held the amateur record for several years till it was beaten by Commander C. B. Fry.

Shortly before his death he was nominated M.B.E. for services in connection with his war-work.

A man of science, a fine sportsman, a generous host, and a charming companion, he leaves behind him a host of friends. *Multis ille bonis flebilis occidit.* [T. F. Bourdillon.]

William Harris, Government Botanist and Assistant Director of Public Gardens in Jamaica, was born at Enniskillen on the 15th November, 1860, and after some years' experience in gardening, was in 1879 taken on the staff at the Royal Botanic Gardens, Kew. Two years later he was appointed on the Director's recommendation to take charge of King's House Garden, Jamaica, Sir Daniel Morris, K.C.M.G., then being Director of Public Gardens and Plantations, and in due course acted as Superintendent in each of the five gardens in that island. On Mr. W. Fawcett's retirement in 1908, Harris became Superintendent of the Public Gardens of the Department of Agriculture; in 1917 he was appointed Government Botanist, and in 1920, a few months before his death, was promoted to be Assistant Director. By his loss botanical exploration in Jamaica has suffered greatly. He was an indefatigable collector, and spent his holidays in the botanical exploration of every part of the island, roughing it in the bush, with the most meagre shelter for the night. Last year he suffered throat trouble, and went to Kansas City, where his eldest son was living, to consult a specialist. The disease was found to be cancer, and he died in hospital on the 11th October, 1920. He had been a Fellow of the Linnean Society since 6th April, 1899.

Botanically he is commemorated by the genera *Harrisia*, Britton (Cactaceæ), and *Harrisella*, Fawc. & Rend. (Orchideæ), and many species have been named after him. [B. D. J.]

John Reader Jackson, who died at Lympstone, Devon, on the 28th October, 1920, was the last survivor of the official staff of the Royal Botanic Gardens, Kew, from the time of Sir William Hooker.

He was born at Knightsbridge in May 1837, but at the age of six he was taken with the rest of the family to Canterbury. His early education was conducted by his father until 1851, when he was sent to London, where he continued his studies under the supervision of an uncle. Having become acquainted with Prof. Thomas Bell, then President of the Linnean Society, he was in turn introduced to Sir William Hooker, Dr. John Lindley, and Robert Brown, resulting in his receiving the appointment as Curator of the Museum at Kew, then in course of formation, which he carried on alone for nearly 20 years, when an assistant was granted. Although his official duties engrossed nearly all his time, he managed to become the author of several works, such as the 'Official Guide to the Kew Museums,' which, originally the work of Daniel Oliver, in the fifth edition, 1871, and sixth edition, 1875, were added to by John R. Jackson; he also edited a new edition of Barton & Castle's 'The British Flora medica' in 1877, and issued his 'Commercial Botany of the Nineteenth Century' in 1890. In addition he contributed numerous short articles to serials, as one on the Whangee Cane in the 16th volume of our

Journal (Botany), many on medicinal plants to the 'Pharmaceutical Journal' and 'Chemist and Druggist,' 'The Gardeners' Chronicle,' and 'The Technologist.'

On reaching the age of 65 in 1902, he left Richmond and settled at Lympstone, where he lived until his death as recorded above. He was elected an Associate on the 2nd April, 1868, and was therefore the oldest Associate in the list by eleven years.

[B. D. J.]

For some time before his death, at his residence on Putney Heath, on the 7th May, 1921, Dr. George Blundell Longstaff, M.A. (Oxon), had been in ill-health, so that the announcement of his death was not unexpected. He was the son of a medical man at Wandsworth, George Dixon Longstaff, M.D., and was born on the 12th February, 1849, educated at Rugby, and New College, Oxford (Scholar, First Class in Natural Science), where an accident early in his academical career destroyed the sight of one of his eyes, afterwards at St. Thomas's Hospital, London. Much of his time was subsequently devoted to municipal and philanthropic work; for four years, 1889–1903, he was a member of the London County Council, and was also a Vice-President of the Statistical and Entomological Societies. In 1912 he published his 'Butterfly Hunting in Many Lands,' the fruit of his varied travel: his recreations were chiefly entomology, botany, and travelling. He became a Fellow of the Linnean Society on the 19th June, 1913, but had been previously a frequent visitor with Mrs. Longstaff, who had been elected in 1908. Besides the Societies already mentioned, Dr. Longstaff was a Fellow of the Geological and Chemical Societies. [B. D. J.]

The recent death of Prof. Alfred Gabriel Nathorst has been felt, not only in the domain of palæobotany, but in a wide circle of friends, many of them in this country. He was born in 1850, but after he had reached man's estate, his life was practically spent in the service of the State Museum in Stockholm.

The question of assigning better accommodation for the botanical portion of the collections belonging to the Academy of Science, including an intendant for the palæobotanic subdivision, was mooted in 1881, and strongly supported by Baron Nordenskiöld in the Rigsdag, but without immediate success. The following year the application was again put forward, and now coupled with the request that "Doctor of Philosophy Alfred Gabriel Nathorst may be appointed for life, or till he be appointed to some other state service"; this was secured in 1884. The building assigned to the new subdivision and its head was in Wallengatan, in a two-storied building, well-remembered by all who have since then visited Nathorst in his corner room, and where so much of his scientific work was done, with the library close at hand. The building itself was old, and at the opposite end to Nathorst's room, cracks showed themselves, even before the contents could be removed into the new building at Frascati, now termed

"Vetenskapsakademien, Stockholm," as a postal address. Nathorst himself has drawn up the official account of the palæobotanical section in the quarto volume, 'Naturhistoriska Riksmuseets historia, Stockholm' [printed at Uppsala, 1916], pp. 245–273.

Secure in this quiet workroom, Nathorst spent the rest of his official life, save when absent on exploring expeditions or scientific visits. One great disadvantage he had, that of total deafness, but it was marvellous to see how quickly he grasped the purport of a question, even when only a few words had been written down on his tablets. His daughter, Fröken Ruth Nathorst, frequently acted as her father's interpreter by finger-speech. The writer remembers that when Nathorst was in London for the Centenary of the Geological Society in 1907, he was taking charge of the Swedish visitor by the tube railway from the dinner at the Criterion to Cromwell Road for the reception, when, on emerging from the exit of the station in the darkness, Nathorst instantly gripped his arm and gave the name of the street they were entering.

The new buildings were occupied in 1916; and the next year Nathorst attained the age of 67, when he was obliged to retire on account of age. He continued his work till the autumn of last year, in spite of some slight heart-attacks, but at last he had to lay down his pen, and after some weeks of increasing debility he breathed his last on the 20th January, 1920.

Beginning in 1869 with a paper on the Cambrian rocks of Scania, he was occupied with recent Arctic plants and plant-remains in several papers published in Swedish journals and one in the English 'Journal of Botany' for 1873, meanwhile gradually tending towards research on fossil plants, as his contribution to Sweden's fossil flora in the Stockholm 'Handlingar' of 1876, and his interesting account of *Williamsonia* flowers from Yorkshire in the 'Öfversigt' for 1880 show. He was elected a Foreign Member of our Society in 1908.

In later years he elaborated new methods of investigation, as the application of collodion to fossils, which, when set, was stripped off and mounted on slides, which, when examined by the microscope, showed the stomata distinctly.

As for his explorations, he visited Spitzbergen in 1870 and 1882, bringing home rich collections; in 1898 he led an important expedition primarily to Beeren Island and Kung Karls Land in search of Andrée; the account of the latter came out in two volumes in 1900, and the scientific portion in a series of papers.

In 1875 he began a long series of papers on the Rhætic flora of Scania, and we owe to him much of our present-day knowledge of the Arctic floras from Devonian to late Tertiary times; he also published on Jurassic plants from Graham Island, Japan, New Siberian islands, and the Yorkshire coast. A large number of genera was established by him, amongst them *Pseudobornia*, *Lycostrobus*, *Cephalotheca*, *Wielandiella*, *Cycadocephalus*, and *Camptopteris*; to him also we owe the term Cycadophyta. [B. D. J.]

Robert Allen Rolfe. On April 18th of the present year Robert Allen Rolfe, an Associate of the Society for 36 years, was laid to rest in Richmond Cemetery under a pall of glorious orchids,—the last and fair tribute of the great establishment he had served, and of the friends who were united with him in the cult of that noble family. With him a hard and earnest worker, driven by a deep and unwavering enthusiasm that amounted almost to a religion, has gone from us. Neither endowed with the liberal education and the broad outlook of a Lindley nor with the domineering self-sure personality of a Reichenbach, he has yet, from a comparatively moderate position and constrained by a multitude of divergent duties, created for himself a world-wide reputation as an orchidologist whose loss will be felt for a long time.

He was born at Ruddington, a small village near Nottingham, on May 12th, 1855. He was brought up as a gardener, and was for some time employed in the gardens in Welbeck Abbey, the seat of the Duke of Portland. It was from there that he came to Kew in 1879; but already in the following year he was appointed an assistant in the Herbarium, winning the post in a competitive examination against eight other candidates. He was early brought into contact with the Orchidaceæ, and his first publication in that direction was a "Revision of the Genus *Phalænopsis*" in the 'Gardeners' Chronicle' of 1886 (vol. xxvi.). Other papers and notes on orchids followed in the next years, but it was not until 1893, the year when he founded the 'Orchid Review,' that he concentrated his efforts on the Orchidaceæ. The 'Orchid Review,' the special organ of the Orchid growers, remained his faithful ward and companion to the end of his life, whilst the more exclusively scientific results of his studies in Orchidaceæ are spread over various journals and the two great floras of Tropical Africa and South Africa ('Flora Capensis'). The Linnean Society especially owes him a paper on the genus *Vanilla* (Journ. vol. xxxi. 1896, pp. 439–478) and the section of the Orchidaceæ of the 'Index Floræ Sinensis' (Journ. vol. xxxvi. 1903, pp. 5-67). The numbers of new species of Orchidaceæ described by R. A. Rolfe amounts to many hundreds, the 'Kew Bulletin' alone being responsible for the publication of almost 500 under the title "New Orchids." His output does not rival in numbers the prodigious figures realised by Reichenbach and some modern authors, but in thoroughness it compares well with any of them, and this is ungrudgingly recognised in letters which have come to hand since Rolfe's death from France, Germany, Austria, Switzerland, and America, whilst in his own country his authority was unchallenged. However, the Orchidaceæ were not the only field where he left his mark. In an institution like Kew no one can specialize in any one branch to the exclusion of all others. The demands on its workers are manifold and the opportunities endless. So found Rolfe himself, occupied with research work here and there outside the domain of his favourite studies, partly in

the execution of his duties and partly following the temptations of alluring problems. But it is characteristic of the man that all those excursions into side paths ran along definite lines with a starting-point in early days, so his work on galls (first paper 1881), Selaginaceæ (1883), the flora of the Philippines (1885), hybrids (1887), etc. His keen interest in the problem of hybridisation led him on to the study of the species of *Rosa* and *Rubus*, but here, like many others, he never came to any settled conclusions, and his work remained shut up in the cabinets of the Herbarium, or perhaps found a new sprouting ground in a congenial mind, for he was communicative enough when he got warm and found a willing ear.

R. A. Rolfe was to have retired from the post of an Assistant in the Herbarium of the Royal Botanic Gardens, Kew, last year, but extension of service for one year was granted. This he did not live to complete. His last illness and death came unexpectedly early, for until then he showed, apart from increasing deafness, no signs of old age, and was full of plans for future work and even for a journey of exploration to Central America. He was an Honorary Fellow and Member of the Royal Horticultural Society, and shortly before his death was awarded by the same Society the Victoria Medal and the Gold Medal of the Veitch Memorial Trust Fund.

Further references to his life and work may be found in the 'Kew Bulletin' for 1921, pp. 123–127, and in the 'Orchid Review,' vol. xxix. pp. 5–8. Portraits of him were published in the 'Gardeners' Chronicle' of 12th February and 23rd April of the present year, and in the 'Orchid Review,' *l. c.*

R. A. Rolfe married, in 1881, Miss Caroline Berkeley Thatcher, of Clifton and Cheddar, by whom he is survived, as well as by one daughter and three sons. [O. Stapf.]

Pier' Andrea Saccardo was born at Treviso, on the 23rd of April, 1845, the son of the engineer, Francesco, of Selva (Volpago), and his wife Elena, born Vidotta, of Treviso. His early education was received at Selva and afterwards at Venice, and subsequently at Padua, at which University he graduated in medicine and in philosophy in 1866.

His earliest employment on emerging from his University was Assistant to Roberto de Visiani, entering upon his duties in November 1866, retaining the post until 1872, when he was appointed Professor of Natural History at the Technical Institute of Padua, then newly founded, until Visiani retired from the Chair of Botany, and Saccardo was called to fill his place in 1877 as Professor and Director of the Botanic Garden, which was confirmed upon the death of Visiani in February 1878. He remained there for the long period of forty-two years, retiring on reaching the age of 70 in 1915.

Padua being threatened with bombardment as a consequence of the disaster of Caporetto in November 1917, he removed to Avellino to the house of his son-in-law, Prof. Trotter, who had married his daughter Maria, staying there till June 1919, when he went back to Padua. A short illness, which did not at first seem serious, carried him off on 11th February, 1920.

It is said that Saccardo's first attempt at the study of botany was in 1857, a boy of twelve, when an uncle had planted an orchard with ticketed specimens; upon this the youngster began to collect and determine the plants of the countryside, and followed up his acquisition of this herbarium by establishing a small botanic garden at Selva. His 'Prospetto della flora trevigiana' was his first printed botanical work; it came out during 1863–64 in the Venetian 'Atti,' and its success seems to have been the determining cause of his devotion to botany; a revision was issued in 1917, one of his last efforts, as 'Flora Tarvisina renovata.' His attention was then attracted to cryptogams, mosses at first, and the 'Mycologiæ Venetæ Specimen' (1873) betrayed the mycologist, who was destined to work so strenuously amongst the fungi. Armed with microscope and micrometer, and gifted with a retentive memory, he issued in succession 'Fungi Veneti novi vel critici' (1873–82); 'Notæ mycologicæ,' ended in 1918; 'Mycotheca Veneta,' a set of 1600 dried specimens, and 'Fungi italici autographice delineati' (1877–86), 1500 plates, the originals being drawn and coloured by the author. In the late 'seventies Saccardo initiated the journal 'Michelia.'

His 'Conspectus generum Pyrenomycetum italicorum systemate carpologico distributorum' shows that he had been studying the problems of mycology so as to evolve a system founded upon the forms of fruit, a scheme which our own countryman, M. C. Cooke, attacked as artificial and better adapted for the use of girls and idle brains, which was vigorously answered by Saccardo. During this time he was busy on the great work of his life, 'Sylloge fungorum,' the first volume of which saw the light in 1882, and closed with the 22nd volume in 1913, having 72,000 species, with MS. material in addition, which would bring up the number to 80,000. Help in this vast work was received from Berlese, De Toni, Trevisan, Sydow, his son Domenico, his son-in-law Trotter, and many others.

A full bibliography of the work of our late Foreign Member will be found in the 'Nuovo Giornale Botanico Italiano,' n. s. xxvii. (1920) pp. 58–74, by Dr. Domenico Saccardo, which is immediately followed by a posthumous paper, "Mycetes borealiamericani," of fourteen pages. He was elected one of our Foreign Members on the 4th May, 1916. [B. D. J.]

Henry Frederick Conrad Sander was born in 1847, and early in life was employed by Messrs. James Carter at their nursery at Forest Hill. Whilst here he met with Benedict Roezl, the

well-known plant collector, with whom he entered into a business arrangement: Roezl to collect, and Sander to receive and dispose of the specimens.

Sander started in business on a very modest scale in George Street, St. Albans, but by 1873 Roezl's consignments of orchids and other exotics became so extensive that he decided to erect a suitable glasshouse, much of which was put up with his own hands. The business proved so successful that in 1881 he established the present large nursery outside the town of St. Albans. At one time he employed no fewer than 23 collectors in different parts of the world, and his importations became so large that he held sales of orchids four days a week in London. During this decade he established a branch in New Jersey, U.S.A., but as the distance from home was great, it was sold. In 1894 an important step was taken by founding a new nursery at St. André, near Bruges, which grew into a large undertaking, with 100 glasshouses, 30 being given up to orchids; his three sons were associated in the business.

The luxurious folio volumes of 'Reichenbachia' were due to his liberality: he received the Victoria Medal of Honour upon its establishment, was Chevalier of the Order of the Crown of Belgium, and was elected F.L.S. on the 2nd December, 1886. He died at Bruges after an operation on 23rd December, 1920, and was buried in the cemetery of St. Albans on the 30th of the same month. [B. D. J.]

Dr. Franz Steindachner, who was elected a Foreign Member of the Linnean Society in 1887, died at Vienna on 10th December, 1919, aged 85. He was a student and friend of Louis Agassiz, and devoted the greater part of his life to systematic ichthyology. He was especially interested in freshwater fishes, and himself made large collections during various journeys in Spain and Portugal, California, and Brazil. Early he joined the staff of the Natural History Museum in Vienna, where he arranged his collections and prepared a long and valuable series of papers and memoirs published chiefly by the Vienna Academy of Sciences. His pioneer contributions to our knowledge of the freshwater fishes of Spain, Portugal, and Brazil are especially noteworthy. He also published some of the first detailed descriptions of fossil fishes from the Tertiary formations of Austria. At the Museum, Steindachner took immediate charge of the reptiles and amphibians as well as fishes, and he occasionally wrote on the new forms received. In 1899 he was promoted to the directorship of the Museum, which he held until his death. Notwithstanding his arduous administrative duties, he still retained his enthusiastic devotion to ichthyology, and he always seemed to have leisure to meet and discuss his favourite study with his younger colleagues. He lived in the official dwelling beneath the Museum, and his genial hospitality, for many years dispensed with the aid of his

sister, will always be remembered with pleasure by those who had the good fortune to experience it. He was a great naturalist, worthy of the esteem and affection in which he was held.

[A. S. W.]

Excluding perhaps the late Sir Dietrich Brandis and Mr. Gamble, no other Indian forester in recent years has done so much to add to our knowledge of systematic botany in India as William Alexander Talbot, whose sad death occurred in Switzerland on the 23rd July, 1917.

Mr. Talbot came to Switzerland in 1911 shortly after retirement from the Indian Forest Service, bringing the greater part of his valuable herbarium with him, and accompanied by his sister who had been his devoted companion for so many years in India. Soon after arrival he purchased the historic mansion known as the Château de Rougemont, situated in the Canton Vaud, hoping to spend the remainder of his days midst the ideal surroundings of that beautiful spot in useful botanical work; but this he was not permitted to do for very long. He only survived in Switzerland for a comparatively short time, namely, six years.

About six months or so before his death, he complained of a feeling of weariness and disinclination for further botanical study; a rest was suggested, and it was thought that after this he would be able to resume his passionately-loved work, but such, unfortunately, was not the case. His health rapidly declined, and he passed peacefully away at the comparatively early age of 62 years, 34 of which were spent in the Bombay Forest Department.

Mr. Talbot, who was an Irishman, was educated at Foyle College, County Londonderry—a college which had the honour of turning out two brothers, Lord and Sir Henry Lawrence of Indian Mutiny fame. John Nicholson, the hero of Delhi, it is interesting to note, hailed from an institution close by in the same county.

After passing an examination in London for the Indian Service, he was sent to the Forest School at Nancy in the Vosges for a three years' course of study in forestry. Having completed this course, he went out to Bombay and arrived there in December 1876, being posted as an Assistant Conservator of Forests, to the Thana District, a district situated at the foot of the western projection of the Ghats. Here, however, he was not permitted to remain very long; after a few months he was transferred to Khandesh, on the Deccan table-land. It was while serving in Khandesh that an episode occurred which very nearly terminated Mr. Talbot's career. When out shooting on one occasion in the Satpura Hills, a magnificent wounded bison charged him in the bamboo jungles there. Many would have been unable to know what to do in such an emergency, but Mr. Talbot with great presence of mind lay flat on the ground, permitting the infuriated bison to pass over his prostrate form.

After a stay of a few months in Khandesh and Kolaba respectively, he was moved in 1878 to the Southern Circle of the Bombay Presidency, in which are comprised the splendid high seedling forests of North Kanara, forming as they do an unbroken chain of about 3000 square miles of tropical woodland.

One can imagine what pleasure and delight arrival in this region must have afforded Mr. Talbot. With his keenness for big game shooting and love of botany, here were conditions of an ideal character for him, which he did not fail to take advantage of to the fullest possible extent, especially as he had the good fortune to be left undisturbed in this region for seventeen years, or half his total period of service. This was probably due to his having soon gained the confidence of his chief, Col. Peyton, the Conservator, who was an intrepid sportsman and keen lover of nature, and he recognised in Mr. Talbot the very man to do full justice to the situation in which he was placed.

It was while out on shooting expeditions with Col. Peyton and excursions with others, that Mr. Talbot, aided by his trained powers of observation, was able to collect the store of botanical information which he put together in book form first in 1894. This was his first modest attempt at a systematic work on the trees, shrubs, and climbers of the Bombay Presidency, and it was published under the authority of the Bombay Government. Several new species were included in this work, as well as numerous others not first noted as found in the Bombay Presidency.

Eight years of further close botanical work enabled him to bring out in 1902 another and much enlarged edition of his first book, which was again published by Government and contained still more trees, shrubs, and climbers new to science and several other species also not known to exist previously in the Presidency.

But Mr. Talbot was now reaching senior rank, and it became necessary to transfer him from Kanara to a post of an administrative character. Much to his chagrin accordingly, he was moved in 1903 to assume control of the Northern Forest Circle of the Bombay Presidency. It was while in administrative charge of this circle that the idea of bringing out an illustrated and much enlarged edition of his previous work, 'Forest Flora of the Bombay Peninsula and Sind,' Poona (1909–11), 2 vols., 4to, took concrete form. With the co-operation of his sister, who is a talented artist, and who is responsible for the illustrations in the book, which are mostly from nature, he started on this laborious and ambitious task. They both worked assiduously together on this *magnum opus* for eight years, *i.e.* till 1910, when Mr. Talbot's enforced retirement from the service owing to age (55 years) was brought about. This work, however, was practically completed, and it was published by Government at a cost of Rs. 15,000, *i.e.* about £1000. Mr. Talbot was given an honorarium of Rs. 5000, *i.e.* £333, for his service and 50 free copies for presentation to friends.

Realising the heavy and responsible duties attached to the post of an administrative officer in charge of a circle, the completion of this last work, consisting of two volumes of quarto size and 1143 pages with 543 illustrations, while actually in harness, cannot but be characterised as a great achievement, reflecting the greatest credit on the author.

For the last three years of his service Mr. Talbot was senior Conservator of Forests in Bombay and adviser of Government on all forest questions, and resided at Poona and Mahableshwar, both hill stations and summer resorts of Government; but the social attractions of these places never appealed to him. He was by nature of a shy, retiring disposition, preferring the companionship of his sister and a few friends to the usual gaieties and pleasures that are associated with life at hill stations.

Very great sympathy is felt for Miss Talbot, who has never recovered from the shock of her brother's death, and who is still in Switzerland lamenting his loss. [G. M. Ryan.]

Hermann Vöchting was born in Blomberg, on the 8th February, 1847, the son of a market-gardener, and with his two brothers and a sister he passed his early childhood among flowers. After his schooldays he spent 16 years as under-gardener in the princely garden of Detmold. During this period he began his botanic training, and was helped by an apothecary, Wessel, in Detmold, the author of a local flora of the Princedom of Lippe. From this place he passed at the beginning of 1867 to an assistant's place in the Berlin Botanic Garden, when Alexander Braun was Director, and largely through his influence he studied the kindred sciences and mathematics, Ascherson, Kny, and Pringsheim being amongst his teachers in botany. In 1870 he returned to Blomberg, and in 1871 he issued his first paper, on *Myriophyllum*; and in the same year he spent three months at Kew for improvement. The next year, 1872, Pringsheim, who had a strong belief in his pupil's powers, offered him the post of assistant in his private laboratory, which offer was joyfully accepted. Whilst here Vöchting prepared for the examination for the doctorate, which he obtained at Göttingen in 1873. The April of the following year he became assistant to Hanstein at Bonn. When Pfeffer removed to Basel in 1877, Vöchting succeeded him at Bonn, and the next year he succeeded to Pfeffer when the latter removed to Tübingen. In 1887, Pfeffer again migrated, this time to Leipzig, and for the third time Vöchting again occupied his vacated position, and at Tübingen he passed the remainder of his days. Soon after his 70th birthday in February, 1917, his health began to fail, and a summer holiday in Switzerland failed to restore it; at a Basel hospital he was informed that his state was hopeless from internal cancer; he journeyed home to Tübingen, and after some months of hospital treatment, died on the 25th November, 1917.

His preliminary treatise has already been cited, but, in addition, may be named 'Bildung der Knollen,' 1887; 'Transplantation

am Pflanzenkörper,' 1892; 'Einfluss des Lichtes auf der Blüthen,' 1893; 'Blüthen-Anomalien,' 1898; 'Knollengewächse,' 1899; 'Anatomie und Pathologie des Pflanzenkörpers,' 1908.

The writer twice met Prof. Vöchting—once when he spent some time in London, and more recently when he came over in 1909 to receive the honorary degree of Sc.D. at the Darwin Celebration at Cambridge in 1909. The recollection will always be retained of a charming and unassuming personality, with the gladness of a child and the wisdom of an old man; the great war brought sadness to him, two of his sons being killed in action. His election as a Foreign Member was comparatively recent, namely, on the 1st May, 1913. [B. D. J.]

Julius von Wiesner died in October 1915, and was buried on the 12th of that month. He was born on the 20th January, 1838, the youngest of a family of eight, at Tscheschen in Moravia, whence the family removed to Brünn when the subject of our memoir was quite young. From 1849 he was at the Gymnasium at Brünn when Mendel was teaching from 1854–1868; he settled in Vienna in 1858, and here among his teachers were Fenzl, Unger, and Ettingshausen. At the age of 22, in the year 1860, he took the degree of Ph.D. at Jena, became extraordinary Professor of Physiological Botany in 1868 at the Polytechnic Institute in Vienna, and two years later, full Professor at the Forest Institute at Mariabrunn, followed in 1873 by his appointment as Professor of Anatomy and Physiology of Plants at Vienna University, and from 1880 he withdrew from teaching at the Polytechnic so that he might concentrate his efforts on his work at the University, where he was destined to devote 36 unbroken years; then, in consequence of attaining the age limit, in 1909 he retired.

Amongst his best known works may be mentioned 'Die Rohstoffe des Pflanzenreiches,' Leipzig, 1873, ed. 2, 1900; 'Die Entstehung des Chlorophylls,' Wien, 1878; 'Das Bewegungsvermögen der Pflanzen; eine Kritische Studie über das gleichnamige Werk von C. Darwin,' 1881; 'Elemente der Anatomie und Physiologie der Pflanzen,' which attained a fifth edition in 1906; whilst his researches on the influence of gravity on leaves, autumnal leaf-fall, the conservation of chlorophyll and the action of light on plants, etc., are well known and appreciated.

He was elected a Foreign Member on the 1st May, 1902; he was happy in having a fortunate youth, a quick and successful career, sound health, long life hardly touched by care, an ample output of scientific work, preserving throughout an optimistic view. [B. D. J.]

June 2nd, 1921.

Dr. A. Smith Woodward, F.R.S., President, in the Chair.

The Minutes of the Anniversary Meeting of the 24th May, 1921, were read and confirmed.

The report of the Donations received since the last Meeting was laid before the Fellows, and the thanks of the Society to the several Donors were ordered.

The President announced that he had appointed the following to be Vice-Presidents for the ensuing year:—Mr. E. T. Browne, Mr. C. C. Lacaita, Mr. Horace W. Monckton, and Lord Rothschild.

Major Stanley Smyth Flower was admitted a Fellow.

Lekshminarayanapuram Subramania Subramaniam, Murray Ross Henderson, and Professor Walter Garstang, M.A., D.Sc. (Oxon), were proposed as Fellows, and Miss Matilda Smith as an Associate.

Certificates in favour of Miss Winifred Mary Ailsa Lomas, B.Sc., and William Rae Sherriffs, M.A., D.Sc. (Aberd.), were read for the second time.

William Small, M.B.E., M.A., B.Sc., William Frederick Bumsted, F.R.M.S., Reginald Ernest Massey, Prof. Rajkumar Sen, M.Sc., William Edward Hollows, Santi Prosad Sen Gupta, B.Ag., F.R.H.S., Shanker Ganesh Sharngapani, B.Ag., Donald Ward Cutler, M.A., John Noel Milsum, F.R.H.S., and John Hyacinth Power, F.Z.S., were elected Fellows.

Prof. Garstang opened a discussion by reading a paper on Recapitulation. He urged that Haeckel's Biogenetic Law was essentially a theory of ancestral heredity. The adult was the creative phase, and "like produced like." Hence ancestors created; heredity transmitted; and development repeated the order of creation. But a generalized recapitulation by ontogeny of the essential grades of ancestral structure was possible without involving successive adult images in the ontogeny; and the morphological test to apply to these rival theories was whether the stages of ontogeny did, or did not, more closely resemble successive adult organisations than the corresponding formative stages of ancestral ontogeny in cases where the ancestry was sufficiently known. This morphological test was invariably in favour of what

might be called the "persistence theory" of recapitulation, and against the theory of accelerated adult incorporations. A tiny stalked larva was probably a feature of every Crinoid from Cambrian age to the present; the heterocercal tail of a Teleost larva was found in the larval as well as in the adult stage of a Sturgeon; the "*Emarginula*" stage of *Fissurella* was much closer to the early post-larval stage of *Emarginula* than to its final condition; the larval *Portunion* lacked the last thoracic feet, like every other Isopod larva; and a Tadpole resembled the larva of a *Polypterus* or Dipnoan far more closely than it resembled the adult of any possible Piscine or Stegocephalic ancestor.

The so-called law of "tachygenesis" had been made much of by palæontologists. But in the case of Ammonites we had no means of distinguishing between environmental influences and hereditary factors. The *Echinospira* larvæ of *Lamellaria* showed how deeply environmental influences might affect the growth of pelagic shells, so as to produce a cyclical series of changes as complete as in any Ammonite, yet independent of any influence from successive adult ancestors.

The discussion was continued by Prof. E. W. MacBride, F.R.S. (visitor), Dr. F. A. Bather, F.R.S. (visitor), Prof. E. S. Goodrich, F.R.S., Sec.L.S., Dr. D. H. Scott, F.R.S., Dr. W. Bateson, F.R.S., Dr. W. D. Lang (visitor), Mrs. C. B. Hodson, and the President, Prof. Garstang replying.

Prof. E. S. Goodrich agreed with Prof. Garstang that an organism in its development does not recapitulate its phylogeny, but merely tends to repeat the ontogenetic stages of its immediate ancestor. He pointed out a fundamental fallacy in the argument for Recapitulation when it assumes that organisms start their development from the same point as their ancestors. Taking for instance the Fish, Amphibian, Reptile, and Mammal, as stages in phylogeny, the Amphibian does not start as a Fish, travelling along the same road and proceeding a little farther. Still less does the Mammal start as a Fish or Amphibian or even a Reptile; its egg is mammalian from the first. The successive stages differ essentially as much from each other in the egg as they do in the adult. In so far as they tend to pass through the same developmental stages as their near ancestor, it is because they start with approximately the same complex of transmitted factors of inheritance and develop under the same conditions. *Phenacodus*, *Hyracotherium*, *Mesohippus* may be considered to represent stages in the phylogeny of the horse. But we may infer that if the one-toed Horse passes through a three-toed stage, it is because its near ancestor the three-toed *Mesohippus* had an embryo with three well-developed toes; and so on down the series. Such cases may be compared to the alleged instances of recapitulation among Ammonites and other fossil Invertebrates. The case of the Brazilian tortoise, cited by Prof. MacBride, differs in no essential from that of *Portunion*. The tortoise passes through a "chelonian" hard-shelled stage before it becomes soft and adapted to life in

crevices, just as the Isopod passes through a crustacean stage before becoming adapted to a parasitic life. In these the divergence between the old and the new mode of life takes place late, and the modification is in the "adult" stage only; but in other organisms, of course, it may take place at any point in the ontogeny.

June 16th, 1921.

Dr. A. Smith Woodward, F.R.S., President, in the Chair.

The Minutes of the General Meeting of the 2nd June, 1921, were read and confirmed.

The report of the Donations received since the last Meeting was laid before the Fellows, and the thanks of the Society to the several Donors were ordered.

Mr. Albert Edward Mills, Mr. Henry Ball, and Mr. Arthur Mayfield, were admitted Fellows.

Miss Kathleen Bever Blackburn, M.Sc. (Lond.), was proposed as a Fellow.

The following certificates were read for the second time:—Lekshminarayanapuram Subramania Subramaniam, Murray Ross Henderson, and Prof. Walter Garstang, M.A., D.Sc. (Oxon); as an Associate, Miss Matilda Smith.

Messrs. George Tertius Dickson, John Francis Donald Tutt, James Robert Ainslie, James Walter White, Thomas Hayton Mawson, Prof. Thomas Wibberley, and Charles Taborn, were elected Fellows.

The first communication was by Mr. Alfred O. Walker, who had sent from his garden a supply of capsules from one plant of *Papaver umbrosum*, hort., which botanists regard as a variety of the Corn-poppy, *P. Rhœas*, showing carpellody of the stamens. The General Secretary showed an illustration of a similar occurrence in another variety of the same species, *P. Rhœas* var. *commutatum*, in Worsdell's 'Plant-teratology,' vol. ii. p. 182, pl. 45. Dr. Rendle pointed out that the satellite carpels contained imperfect ovules. Mr. Henry Bad and Mr. R. Paulson also took part in the discussion.

Mr. Wilfred Mark Webb exhibited a specimen of a woodlouse rare in Britain, *Ligidium hypnorum*, which he had found in Berkshire recently; its previous records were Surrey in 1873 by

the Rev. T. R. R. Stebbing and 1902 in Essex by himself. Prof. E. S. Goodrich, Sec.L.S., made a few remarks upon the exhibition.

[Since the Meeting Mr. R. S. Bagnall, F.L.S., has reported that Dr. W. E. Collinge has also recorded this species, "while I have taken it in very large numbers in the Bath district, and this Easter a single specimen in Lancashire. In the Bath district it is one of the commonest of species."]

Prof. A. H. Reginald Buller, introduced by Dr. A. B. Rendle, Sec.L.S., gave a discourse "Upon the Ocellus Function of the Subsporangial Swelling of *Pilobolus*." He stated that the subsporangial swelling of *Pilobolus* functions, not merely as part of a squirting apparatus, *but also as an ocellus*, which receives the heliotropic stimulus which causes the stipe to turn the fungus gun toward the light. The swelling is "transparent and refracts light, like the bulb of a Florence flask filled with water. Its diameter is always greater than that of the black sporangium which it supports.

The sporangiophore of *Pilobolus* appears to be the only orthoheliotropic plant organ known which takes up its positively heliotropic position owing to the possession of a special light-perceiving cell-structure.

Pilobolus may well be described as a fungus with an optical sense-organ or simple eye; and, in using its eye for laying its gun, it appears to be unique in the plant world.

The paper was illustrated with models. A fuller account of the *Pilobolus* eye is about to appear in the 'Transactions of the British Mycological Society.'

A discussion followed in which these were engaged: Mr. E. J. Butler, Prof. R. R. Gates, and Capt. Ramsbottom. Prof. Buller replying.

Major R. B. Seymour Sewell, I.M.S. (visitor), read a paper by Dr. N. Annandale (who was prevented by illness from presenting the paper himself), entitled "The vegetation of an island in Chilka Lake on the east coast of India, considered as a preliminary to a study of its fauna," of which the following is an abstract:—

In order to appreciate the fauna of a small island in the Chilka Lake on the east coast of India, the Author has found it necessary to study the vegetation. The area of the island is about one-third of a square mile, and the rocks are composed of garnet-bearing quartzite which yields an infertile and scanty soil on weathering. The climate is relatively dry. The vegetation consists mainly of trees, shrubs, and perennial creepers, with a great scarcity of herbs, ferns, and epiphytes, and a complete absence of palms, bamboos, screw-pines, and orchids. The genus *Ficus* has the largest number of species (7): the commonest tree is the Nim (*Azadirachta indica*), the commonest shrub *Glycosmis pentaphylla*, Dc. and the commonest creeper *Vitis quadrangularis*. Several distinct

zones of vegetation can be distinguished. The most interesting is the central thicket, in which *Ficus gibbosa* is rapidly replacing *F. bengalensis*, giving space also, by its less spreading habit, for trees and shrubs of other genera. The peculiarities of the fauna, and especially its deficiencies and generalized character, can be correlated directly with the vegetation.

The slides which followed were explained by Major Sewell.

Col. M. J. Godfery read his paper on the fertilization of the orchid genus *Cephalanthera*, as observed by him in the south of France on *C. rubra*, *C. ensifolia*, and *C. grandiflora*, the last being the species which was studied by Darwin. The Author holds that *Cephalanthera* is an old genus, existing before *Epipactis* came into being, and was not derived from the latter.

Dr. Rendle commented on several points of interest in the paper, and a question was put by Mr. T. A. Dymes which was answered by the Author.

BENEFACTIONS.

List *in accordance with Bye-Laws, Chap.* XVII. *Sect.* 1, *of all Donations of the amount or value of Twenty pounds and upwards, received during the past Twenty years.*

1901.

Hon. Charles Ellis, Hon. Walter Rothschild, Frank Crisp, Esq., F. D. Godman, Esq., and the Bentham Trustees: The Correspondence of William Swainson.

Royal Society: Contribution towards Mr. F. Chapman's paper on Funafuti Foraminifera, £50.

Prof. E. Ray Lankester: Contribution towards illustration, £30 5*s*.

Portrait of Dr. St. G. J. Mivart, presented by Mrs. Mivart.

1903.

Royal Society: Contribution toward Dr. Elliot Smith's paper, £50.

Legacy from the late Dr. R. C. A. Prior, £100 free of duty.

Mrs. Sladen: Posthumous Portrait of the late Walter Percy Sladen, by H. T. Wells, R A.

B. Arthur Bensley, Esq.: Contribution to his paper, £44.

1904.

Royal Society: Grant in aid of third volume of the Chinese Flora, £120.

Frank Crisp, Esq. (afterwards Sir Frank Crisp, Bt.): Cost of Supplementary Royal Charter.

The same: Bulliard (P.). Herbier de la France; Dictionnaire; Histoire des plantes vénéneuses; Champignons, in 10 vols. Paris, 1780–1812.

1905.

Royal Society: First grant in aid of Dr. G. H. Fowler's 'Biscayan Plankton,' £50.

Executors of the late G. B. Buckton, Esq.: Contribution for colouring plates of his paper, £26.

1906.

Royal Society: Second grant towards 'Biscayan Plankton,' £50.

Subscription portrait of Prof. S. H. Vines, by Hon. John Collier.

Royal Swedish Academy of Science: Copies of portraits of C. von Linné, after Per Krafft the elder, and A. Roslin, both by Jean Haagen.

1907.

Royal University of Uppsala: Copy by Jean Haagen of portrait of C. v. Linné, by J. H. Scheffel (1739).

Royal Society: Third and final grant towards 'Biscayan Plankton,' £50.

The Trustees of the Percy Sladen Memorial Fund: First grant towards publication of Mr. Stanley Gardiner's Researches in the Indian Ocean in H.M.S. 'Sealark,' £200.

1908.

Prof. Gustaf Retzius: Plaster cast of bust of Carl von Linné, modelled by Walther Runeberg from the portrait by Scheffel (1739) at Linnés Hammarby: the bronze original designed for the façade of the new building for the Royal Academy of Science, Stockholm.

Miss Sarah Marianne Silver (afterwards Mrs. Sinclair), F.L.S. Cabinet formerly belonging to Mr. S. W. Silver, F.L.S.

1909.

The Trustees of the Percy Sladen Memorial Fund: Second grant towards publication of Mr. Stanley Gardiner's Researches in the Indian Ocean in H.M.S. 'Sealark,' £200.

Prof. James William Helenus Trail, F.R.S., F.L.S.: Gift of £100 in Trust, to encourage Research on the Nature of Protoplasm.

1910.

Royal Society: Grant towards Dr. G. H. Fowler's paper on Biscayan Ostracoda, £50.

Sir Joseph Hooker: Gold watch-chain worn by Robert Brown, and seal with portrait of Carl von Linné by Tassie.

Prof. J. S. Gardiner: Payment in aid of illustrations, £35 0*s.* 6*d.*

Sir Frank Crisp: Donation in Trust for Microscopical Research, £200.

The Trustees of the Percy Sladen Memorial Fund: Third grant towards publication of Prof. Stanley Gardiner's Researches in the Indian Ocean, £200. (For third volume.)

1911.

The Trustees of the Percy Sladen Memorial Fund: Second Donation towards the publication of the third volume on the Indian Ocean Researches, £70.

The same: First Donation towards the fourth volume, £130.

1912.

The Indian Government: Contribution towards the illustration of Mr. E. P. Stebbing's paper on Himalayan *Chermes*, £46 15*s.* 2*d.*

The late Mr. Francis Tagart, £500 free of Legacy Duty.

The late Sir Joseph Dalton Hooker, O.M., G.C.S.I., £100 free of Legacy Duty.

The Trustees of the Percy Sladen Memorial Fund: Second Donation towards the publication of the fourth volume on the Indian Ocean Researches, £140.

The same: First Donation towards the fifth volume, £60.

1913.

Royal Society: Grant towards Dr. R. R. Gates's paper on Mutating Oenotheras, £60.

Sir Frank Crisp, Bt., Wallichian Cabinets, £50.

The Trustees of the Percy Sladen Memorial Fund: Second Donation towards the publication of the fifth volume, £200.

1914.

Royal Society: Grant towards Miss Gibbs's paper on the Flora of British North Borneo, £50.

Miss Foot: Cost of illustration of her paper on *Euschistus*.

The Trustees of the Percy Sladen Memorial Fund: Third Donation towards the fifth volume, £10.

The same: First Donation towards the sixth volume, £190.

1915.

The Trustees of the Percy Sladen Memorial Fund: Second Donation towards the sixth volume, £80.

Miss Foot: Cost of second paper on *Euschistus*, £32 10*s.*

Royal Society: Donations towards the cost of a paper by Mrs. Arber, D.Sc., £40.

The same: towards paper on Utakwa River plants by Mr. H. N. Ridley, C.M.G., F.R.S., £50.

Miss Marietta Pallis: Instalment of cost of her paper on Plav, £30.

Thomas Henry Riches, Esq.: Dr. A. R. Wallace's library on Natural History.

Sir Frank Crisp, Bt.: New shelving for Wallace's Volumes.

1916.

Mr. E. Heron-Allen: Contribution to cost of paper on Foraminifera of N.W. Scotland, £44.

Messrs. H. Takeda and C. West: Contribution towards the illustration of their paper, £40.

Royal Society: Contribution towards the illustration of two papers by Prof. Dendy, £40.

The same: Contribution towards Mr. Swynnerton's paper on Form and Colouring, £70.

The High Commission for the Union of South Africa, per Dr. J. D. F. Gilchrist, for the illustration of his paper on *Jasus Lalandii*, £30.

Miss Marietta Pallis: Balance of cost of her paper on Plav, £90 16*s.* 6*d.*

Sir Frank Crisp, Bt.: Phototyped copy of Dioscorides from the 'Codex Aniciæ Julianæ' at Vienna.

1917.

British Ornithologists' Union, etc.: Contribution towards cost of Mr. H. N. Ridley's paper, £20.

The Royal Society: Second contribution towards the printing of Mr. C. F. M. Swynnerton's paper on Form and Colouring, £75.

Sir Frank Crisp, Bt.: 'Lindenia,' Ghent, 1891–1901. 17 vols. sm. fol.

1919.

Dr. B. Daydon Jackson: MS. index to Linnean Society's Journal, Botany, vols. xxi.–xl. (1884–1912) and the Botanic entries in the 'Proceedings' for the same period.

1920.

The Royal Society: Third contribution towards the printing of Mr. C. F. M. Swynnerton's paper as above, £50.

The High Commission for the Union of South Africa, for the printing of Dr. J. D. F. Gilchrist's paper on *Jasus Lalandii*, Part II., £60.

1921.

The Percy Sladen Memorial Fund: Additional Grant in aid of publication of 'Transactions,' 2nd ser., Zoology, vol. xvii. part 4, £72 10*s.*

The same: Grant in aid of publication of four papers on the Houtman Abrolhos Islands, £100.

The Royal Society: Donation in aid of papers by Mr. N. E. Brown and Mr. S. L. Moore, £90.

Dr. W. Rushton Parker: Donation of a large series of portraits of Naturalists and Persons after whom Genera have been named, and work on rearrangement and annotation of the entire collection.

ADDITIONS AND DONATIONS

TO THE

LIBRARY.

1920–1921.

Agar (W. E.). Cytology. With special reference to the Metazoan Nucleus. 8vo. *London*, 1920.

Arber (Agnes). Water Plants. A Study of Aquatic Angiosperms. 8vo. *Cambridge*, 1920.

Arcangeli (Alceste). Sulla ricerca microchemica del fosforo nei tessuti vegetali. (Atti Soc. Tosc. Sci. Nat. xviii.) 8vo. *Pisa*, 1902. **C. C. Lacaita.**

—— Il mimetismo nel regno vegetale. (Atti Soc. Tosc. Sci. xix.) 8vo. *Pisa*, 1903. **C. C. Lacaita.**

—— Appunti sul tallo dell' *Usnea sulphurea*, Fr. (Atti Soc. Tosc. Sci. Nat. xx.) 8vo. *Pisa*, 1904. **C. C. Lacaita.**

rcangeli (Giovanni). Esperienze effettuate sopra un piccola allevamento di Baco da seta. (Atti R. Accad. Georgofili, xxv.) 8vo. *Firenze*, 1902. **C. C. Lacaita.**

—— Sulle disposizioni igieniche da adottarsi riguardo all' alimentazione per Funghi. (Soc. Ital. Med. Internat. Congr. Med. xi.) 8vo. *Roma*, 1902. **C. C. Lacaita.**

—— Sul *Tetranychus aurantii* Targioni-Tozzetti e sul *Tetranychus telarius* (L.) Dugès. (Agric. Ital. 1903.) 8vo. 1903. **C. C. Lacaita.**

—— Di nuovo sugli avvelenamenti per funghi. (Atti R. Accad. Georgofili (4) i.) 8vo. *Firenze*, 1904. **C. C. Lacaita.**

—— Per l'inaugurazione dell' esposizione regionale dei crisantemi tenuta in Pisa dal 10 al 20 Novembre, 1904. (Bull. R. Soc. Tosc. Orticol. xxix.) 4to. *Firenze*, 1904. **C. C. Lacaita.**

—— Sull' esplorazioni polari e sui ghiacci polari. (Proc. Verb. Soc. Tosc. Sci. Nat. xxiv.) 8vo. *Pisa*, 1915. **C. C. Lacaita.**

—— Alcune altre osservazioni sulla *Victoria regia*, Lindl. (Proc. Verb. Soc. Tosc. Sci. Nat. xxv.) 8vo. *Pisa*, 1916. **C. C. Lacaita.**

—— Di nuovo sulle piante di *Pinus Pinea* var. *fragilis*, coltivate nell' Orto botanico pisano. (Proc. Verb. Soc. Tosc. Sci. Nat. xxv.) 8vo. *Pisa*, 1916. **C. C. Lacaita.**

—— Sopra alcuni fossili della Sardegna e di Jano. (Proc. Verb. Soc. Tosc. Sci. Nat. xxv.) 8vo. [*Pisa*, 1916]. **C. C. Lacaita.**

—— Di nuovo sopra alcune varietà del *Diospyros Kaki* e sul Melanogramma del Kako. (Proc. Verb. Soc. Tosc. Sci. Nat. xxvi.) 8vo. [*Pisa*]. **C. C. Lacaita.**

Arcangeli Giovanni. Sopra alcune varietà del *Phaseolus Kidd* e specie affini. Malattie predominanti in una di esse. (Prov. Vero. Soc. Lav. Sci. Nat. xxv). Svo. *Flor.* 1916. C. C. Lacaita.

Atlases.

An Atlas of Ancient Geography. By Samuel Butler. Svo. *London*, 1867.

School Atlas of Classical Geography. By Alex. Keith Johnston. 4to. *London*, 1866.

Popular Atlas of the British Isles. By G. W. Bacon. 4to. *London*, 1904. *Dr.* W. Rushton Parker.

Austen (E. E.). *See* British Museum (Natural History). Guide Books, etc. Economic Series, No. 1 *a*.

Bacon G. W.). *See* Atlases. Popular Atlas of the British Isles.

Baker (Richard. T.). The Hardwoods of Australia and their Economies. 4to. *Sydney*, 1919. Author.

Beddard (Frank Evers). Mammalia. (The Cambridge Natural History.) Svo. 1909. *Dr.* W. Rushton Parker.

Blanford (W. T.). The Fauna of British India, including Ceylon and Burma. Svo. *London*, 1888–1921.

Mollusca, III.: Land Operculates. By G. K. Gude.

Bose (Sahay Ram). Polygraecia of Bengal. (Bull. Carmichael Med. Coll., No. 1.) 4to. *Calcutta*, 1920. Author.

Boulenger George Albert). *See* British Museum (Natural History). Reptiles: Monograph of the Lacertidæ.

Bradley Bibliography. *See* Rehder (Alfred).

British Museum (Natural History).

British Antarctic ("Terra Nova") Expedition, 1910.

Zoology. Vol. II. No. 9. Mollusca. Part III. Eupteropoda, Pteropoda Thecosomata) and Pterota (Pteropoda Gymnosomata). By Anne L. Massy.

No. 10. Mollusca. Part IV. Anatomy of Pelecypoda. By R. H. Burne.

" Vol. IV. No. 6. Echinoderma. Part V. and Enteropneusta. Larvæ of Echinoderma and Enteropneusta. By E. W. MacBride.

Reptiles.

Monograph of the Lacertidæ. By George Albert Boulenger. 4to. *London*, 1920.

Arachnida.

Studies on Acari. No. 1. The Genus *Lamellobates*. Oudem. By Stanley Hirst. 4to. *London*, 1919.

Insects.

Dipterous Insects.

A Handbook of British Mosquitoes. By William Dodge Lange. 4to. *London*, 1920.

Lepidopterous Insects.

Catalogue of the Lepidoptera Phalænæ in the British Museum. Vol. II. Supplement. Catalogue of the Lithosiadæ (Arctianæ) and Phalænotidæ. By Sir GEORGE F. HAMPSON. Text and Atlas. 8vo. *London*, 1920.

GUIDE-BOOKS, ETC.

Summary Guide to the Exhibition Galleries. 8vo. *London*, 1920.

Economic Series:

No. 1*a*.—The House Fly. Its Life-History and practical Measures for its Suppression. By E. E. AUSTEN. 8vo. *London*, 1920.

No. 9.—Birds beneficial to Agriculture. By F. W. FROHAWK. 8vo. *London*, 1919.

No. 10.—Marine Boring Animals injurious to submerged Structures. By W. T. CALMAN. 8vo. *London*, 1919.

No. 11.—Furniture Beetles. Their Life-History and how to check or prevent the Damage caused by the Worm. By CHARLES J. GAHAN. 8vo. *London*, 1920.

Britton (**Nathaniel Lord**) and **Millspaugh** (**Charles Frederick**). The Bahama Flora. 8vo. *New York*, 1920.

Britton (**N. L.**) and **Rose** (**J. N.**) The Cactaceæ. Descriptions and Illustrations of Plants of the Cactus Family. Vols. I., II. 4to. *Washington*, 1919–20. **Tagart Bequest.**

Bull (**Henry Graves**). Notes on the Birds of Herefordshire. 8vo. *London & Hereford*, 1888. *Rev.* **G. R. Bullock-Webster.**

Butler (**Samuel**). *See* **Atlases.** An Atlas of Antient Geography.

Burne (**R. H.**). *See* **British Museum** (**Natural History**). 'Terra Nova' Expedition. Zoology, vol. ii. no. 10.

Carano (**Enrico**). Sulla particolare struttura delle radici tuberizzate di *Thrincia tuberosa*, DC. (Ann. Bot. i.) 8vo. *Roma*, 1903. **C. C. Lacaita.**

—— Alcune osservazioni sulla morfologia delle *Hypoxidaceæ*. (Ann. Bot. ii.) 8vo. *Roma*, 1904. **C. C. Lacaita.**

—— Contribuzione alla conoscenza della morfologia e dello sviluppo del fascio vascolare delle foglie delle *Cicadaceæ*. (Ann. Bot. i.) 8vo. *Roma*, 1903. **C. C. Lacaita.**

—— Su la struttura di stami anomali nel *Papaver Rhœas*, L. (Ann. Bot. ix.) 8vo. *Roma*, 1911. **C. C. Lacaita.**

—— Su l'origine e su la differenziazione dei tessuti nelle foglie. (Ann. Bot. ix.) 8vo. *Roma*, 1911. **C. C. Lacaita.**

—— Ricerche sull' embriogenesi delle Asteraceæ. (Ann. Bot. xiii.) 8vo. *Roma*, 1915. **C. C. Lacaita.**

—— Sull' embriologia di *Poinsettia pulcherrima*, R. Grah. (Ann. Bot. xiii.) 8vo. *Roma*, 1915. **C. C. Lacaita.**

Carpenter (**G. D. Hale**) A Naturalist on Lake Victoria. With an Account of Sleeping Sickness and the Tse-Tse Fly. 8vo. *London* [1920]. **Author.**

Cash (James) and **Wailes (George Herbert)**, assisted by JOHN HOPKINSON. The British Freshwater Rhizopoda and Heliozoa. Vol. V. Heliozoa (Ray Society). 8vo. *London*, 1921.

Cavara (Fridiano). Sulla necessita della coltura di piante medicinali in Italia. (R. Istituto d'Incor. Napoli, 1918.) 4to. *Napoli*, 1918. **C. C. Lacaita.**

Clements (Frederic E.). Plant Indicators. The Relation of Plant Communities to Process and Practice. 4to. *Washington*, 1920.

Cockayne (L.). New Zealand Plants and their Story. Second Edition. 8vo. *Wellington, N.Z.*, 1919.

Collinge (Walter E.). The Necessity of State Action for the Protection of Wild Birds. (Avicultural Mag. x.) 8vo. 1919. **Author.**

Cornish (C. J.). The Living Animals of the World. 2 vols. 4to. *London*, [?]. *Dr.* **W. Rushton Parker.**

Dawe (M. F.). Account of a Journey through the Western Portion of Colombia, showing the Possibilities of the Economic Development of the Districts visited. 4to. *London*, [1919]. **Author.**

De Wildeman (Emile). Plantes nouvelles ou peu connues contenues dans l'Herbier de l'Hortus Thenensis. Avec les descriptions ou annotations de M. Em. de Wildeman. Vols. I., II., livr. 1–3. 4to. *Bruxelles*, 1904–1910.

Dixon (H. N.). Contributions to Antarctic Bryology. (The Bryologist, xxiii.) 8vo. 1920. **Author.**

Dobie (Wm. Murray). On the Cilia of *Grantia*. (Goodsir's Ann. Physiol.) 8vo. 1851. **Lister Institute.**

Dragnewitsch (Pawla). Spongien von Singapore. Inaugural-Dissertation der Hohen philosophischen Fakultät der Universität Bern zur Erlangung der Doktorwürde. 8vo. *Bern*, 1905. **Lister Institute.**

Dymes (Thomas Alfred). The Nature-Study of Plants. In Theory and Practice for the Hobby Botanist. With an Introduction by F. E. WEISS, F.R.S. 8vo. *London*, 1920. **Author.**

East (Edward M.) and **Jones (Donald F.)**. Inbreeding and Outbreeding. Their Genetic and Sociological Significance. 8vo. *Philadelphia*, 1919.

Engler (Adolf) and **Gilg (Ernst)**. Syllabus der Pflanzenfamilien. 8th Edition. 8vo. *Berlin*, 1919.

Fiori (Adr.). L'allevamento dei Pioppi dai semi e sua convenienza tecnica ed economica. (L'Alpe (ii.) vi.) 8vo. *Firenze*, 1919. **C. C. Lacaita.**

Fitch (W. H.) and **Smith (W. G.)**. Illustrations of the British Flora. 4th Edition. 8vo. *London*, 1916. *Dr.* **W. Rushton Parker.**

Fox (R. Hingston). Dr. John Fothergill and his Friends. 8vo. *London*, 1919. **Author.**

Fristedt (Konrad). Sponges from the Atlantic and Arctic Oceans, and Behring Sea. (Dvega-Exped. Vet. Iaktt. Bd. iv. 1887.) 8vo. *Stockholm*, 1887. **Lister Institute.**

Gahan (Charles J.). *See* **British Museum (Natural History).** Guide Books, etc. Economic Series. No. 11.

Gilg (Ernst). *See* **Engler (Adolf).**

Gude (G. K.). *See* **Blanford (W. T.).** The Fauna of British India, including Ceylon and Burma. Mollusca, III.

Guppy (H. B.). Fossil Botany in the Western World. An Appreciation. (Amer. Journ. Sci. xlix.) 8vo. 1920. **Author.**

Harley (John). Contributions to Medical Science. 8vo. 1864–1889. **Author.**

Hirst (Stanley). *See* **British Museum (Natural History).** Arachnida. Studies on Acari. No. 1.

Johnston (Alex. Keith). *See* **Atlases.** School Atlas of Classical Geography.

Johnston (*Sir* Harry). British Mammals. 4to. *London*, 1903. *Dr.* **W. Rushton Parker.**

Jones (Donald F.). *See* **East (Edward M.).**

Jourdain (*Rev.* F. C. R.). *See* **Mullens (W. H.).**

Keane (A. H.). The World's Peoples. 8vo. *New York*, 1908. *Dr.* **W. Rushton Parker.**

Kidd (Walter). Initiative in Evolution. 8vo. *London*, 1920. **Author.**

Kirkpatrick (R.). Descriptions of South African Sponges. I.–III. 8vo. *Cape Town*, 1902–3. **Lister Institute.**

Lambe (Lawrence M.). Catalogue of the recent marine Sponges of Canada and Alaska. (Ottawa Nat. xiv.) 8vo. 1900. **Lister Institute.**

—— Description of a new Species of calcareous Sponge from Vancouver Island, B.C. (Ottawa Nat. xiii.) 8vo. 1900. **Lister Institute.**

—— Notes on Hudson Bay Sponges. (Ottawa Nat. xiii.) 8vo. 1900. **Lister Institute.**

—— A new recent marine Sponge (*Esperella bellabellensis*) from the Pacific Coast of Canada. (Ottawa Nat. xix.) 8vo. [*Ottawa*, 1905]. **Lister Institute.**

Lang (William Dickson). *See* **British Museum (Natural History).** Insects (Dipterous). A Handbook of British Mosquitoes.

Lankester (*Sir* Edwin Ray). Extinct Animals. 8vo. 1909. *Dr.* **W. Rushton Parker.**

Lendenfeld (Robert von). *Spinosella infundibulum*, n. sp. 8vo. *Altenburg, S.A.*, 1912. **Lister Institute.**

—— Der Tierstamm der Spongien. 8vo. **Lister Institute.**

Lindman (C. A. M.). Svensk Fanerogamflora. 8vo. *Stockholm*, 1918.

Lydekker (R.). A Geographical History of Mammals. 8vo. *Cambridge*, 1896. *Dr.* **W. Rushton Parker.**

MacBride (E. W.). *See* **British Museum (Natural History).** 'Terra Nova' Expedition, Zoology, vol. iv. no. 3.

Marindin (G. E.). A smaller Classical Dictionary of Biography, Mythology, and Geography. 8vo. *London*, 1910. *Dr.* **W. Rushton Parker.**

Massy (Anne L.). *See* **British Museum (Natural History).** 'Terra Nova' Expedition, Zoology, vol. ii. no. 9.

Mattiroli (Oreste). Contribuzione allo studio della *Monilia sitophila* (Mont.) Sacc. (Atti R. Accad. Sci. Torino, lii.)
8vo. *Torino*, 1918. **C. C. Lacaita.**

—— I bulbi del *Muscari comosum* Mill. (Cipollaccio col. fiocco) proposti come alimento anche alle popolazioni dell' Italia settentrionale. (Ann. R. Accad. Agric. Torino, lxi.)
8vo. *Torino*, 1918. **C. C. Lacaita.**

Mayer (Alfred Goldsborough). Medusæ of the World.
Vol. I. } The Hydromedusæ.
„ II. }
„ III. The Scyphomedusæ.
4to. *Washington, D.C.*, 1910. **Tagart Bequest.**

Metschnikoff (El.). Beiträge zur Morphologie der Spongien.
8vo. *Odessa*, 1876. **Lister Institute.**

Millspaugh (Charles Frederick). *See* **Britton (Nathaniel Lord).**

Morgan (Thomas Hunt). The Physical Basis of Heredity.
8vo. *Philadelphia & London*, [1919].

Moss (Charles Edward). Assisted by Specialists in certain Genera. The Cambridge British Flora; illustrated from Drawings by E. W. Hunnybun. Vol. III. Portulacaceæ to Fumariaceæ. (Text, pp. xvi, 200; Plates, pp. vi.)
4to. *Cambridge*, 1920.

Mullens (W. H.), Swann (H. Kirke), and Jourdain (*Rev.* F. C. R.). A Geographical Bibliography of British Ornithology from the Earliest Times to the End of 1918. Arranged under Counties.
8vo. *London*, 1920.

Murray's Handy Classical Maps. Eleven.
8vo. *London*, 1903. *Dr.* **W. Rushton Parker.**

Paxton (Joseph). Botanical Dictionary, comprising the Names, History, and Culture of all Plants known in Britain. New Edition by Samuel Hereman.
8vo. *London*, 1868. *Dr.* **W. Rushton Parker.**

Pearl (Raymond). Sterilization of Degenerates and Criminals considered from the Standpoint of Genetics. (Eugenics Review, 1919.) 8vo. **Author.**

—— The Significance of some general Biologic Principles in Public Health Problems. (Journ. Amer. Med. Assoc. lxxiv.)
8vo. *Chicago*, 1920. **Author.**

Pelly (S. A.). Glossary and Notes on Vertebrate Palæontology.
8vo. *London*, (1918). *Dr.* **W. Rushton Parker.**

Porter (Noah). *See* **Webster (Noah).**

Pusa. Report of the Proceedings of the Third Entomological Meeting held at Pusa on the 3rd to 15th February, 1919. In Three Volumes. Edited by T. Bainbrigge Fletcher.
8vo. *Calcutta*, 1920. **The Editor.**

Ray Society. *Publications* (continued).

Cash (James) and Wailes (George Herbert), assisted by John Hopkinson. The British Freshwater Rhizopoda and Heliozoa. Vol. V. Heliozoa, by G. H. Wailes.
8vo. 1921.

Rehder (Alfred). The Bradley Bibliography. A Guide to the Literature of the Woody Plants of the World published before the Beginning of the Twentieth Century. Vols. I.–V.
4to. *Cambridge (Mass.)*, 1911–1918. *Prof.* **C. S. Sargent.**

Rose (J. N.). *See* **Britton (N. L.).**

Saunders (Howard). An illustrated Manual of British Birds.
8vo. *London*, 1899. *Dr.* **W. Rushton Parker.**

—— A List of British Birds. Revised to July 1907.
8vo. *London*, 1907. *Dr.* **W. Rushton Parker.**

Scudder (Samuel Hubbard). Index to the known Fossil Insects of the World. 8vo. *Washington*, 1891.

Shaw (George Russell). The Genus *Pinus*. (Arnold Arboretum Pubs. No. 5.) 4to. *Cambridge*, 1914.

Skeat (*Rev.* Walter W.). A concise Etymological Dictionary of the English Language. 8vo. *Oxford*, 1887.
Dr. **W. Rushton Parker.**

Smith (William). A Dictionary of Greek and Roman Biography and Mythology, by various Writers. 3 vols.
8vo. *London*, 1873. *Dr.* **W. Rushton Parker.**

—— A Smaller Dictionary of Greek and Roman Antiquities.
8vo. *London*, 1907. *Dr.* **W. Rushton Parker.**

Spencer (Leonard J.). The World's Minerals.
8vo. *London*, 1911. *Dr.* **W. Rushton Parker.**

Swann (H. Kirke). *See* **Mullens (W. H.).**

Swartschewsky (B.). Materialui faunui gubok' chernago morya (Monaysnida). (Beitr. z. Kenntniss der Schwamm-Fauna des Schwarzen Meeres.) 8vo. *Kiev*, 1905. **Lister Institute.**

Tempère (J.). Spicules d'Eponges. 8vo. 1897.
Lister Institute.

Thomson (J. Arthur). Outlines of Zoology.
8vo. *Edinburgh, etc.*, 1914. *Dr.* **W. Rushton Parker.**

Topsent (E.). Sur une magnifique *Geodia megastrella* Carter du Muséum de la Rochelle. 8vo. *La Rochelle*, 1911.
Lister Institute.

Urban (F.). Zur Kenntniss der Biologie und Cytologie der Kalkschwämme (Familie Clathrinidæ, Minch.).
8vo. *Leipzig*, 1910. **Lister Institute.**

Wailes (George Herbert). *See* **Cash (James).**

Weaver (John E.). The Ecological Relations of Roots.
4to. *Washington*, 1919.

Webster (Noah). International Dictionary of the English Language. Revised and enlarged by NOAH PORTER.
4to. *London & Springfield, Mass.*, 1891.
Dr. **W. Rushton Parker.**

White (C. T.). A rare and beautiful native Tecoma.
8vo. **Fred. Turner.**

Wight (Robert). Icones Plantarum Indiæ Orientalis; or Figures of Indian Plants. 5 vols. (vol. 6 missing).
4to. *Madras*, 1840–52. *Sir* **Arthur Dorward.**

Wight (Robert). Spicilegium Neilgherrense; or a Selection of Neilgherry Plants. 4to. *Madras*, 1846–51.
Sir **Arthur Dorward.**

Wilson (Ernest Henry). The Cherries of Japan. (Arnold Arboretum Pubs. No. 7.) 8vo. *Cambridge*, 1916.

—— The Conifers and Taxads of Japan. (Arnold Arboretum Pubs. No. 8.) 4to. *Cambridge*, 1916.

Woods (Joseph). Letters of an Architect from France, Italy, and Greece. Vols. I. and II. 4to. *London*, 1828.
Miss **Elizabeth Wood.**

Woodward (Horace B.). Stanford's Geological Atlas of Great Britain and Ireland. 8vo. *London*, 1914.
Dr. **W. Rushton Parker.**

ABSTRACT.

Shetland Plants. By G. Claridge Druce.

(See page 14.)

In July and August of 1920 I visited the mainland and Unst in company with Prebendary the Rev. R. J. Burdon. The weather was not propitious, for we followed a spell of dry weather which hastened the flowering period, while the rain we met was too recent to have had much influence upon the vegetation. We had the advantage of having Mr. Beeby's notes, made on his numerous visits, and we can testify to the general accuracy of his painstaking and unwearied labours in this by no means easily explored district. I was able to add the following species to the flora :—*Cerastium subtetrandrum*, *Bursa Brittonii*, *Rhinanthus borealis*, *Potamogeton suecicus*, *P. rutilus*, and *Poa irrigata*.

Senecio aquaticus Huds. is common and differs from the southern form in its lesser stature, more conspicuous ligules, and its more compact inflorescence which, as Beeby says, forms an inverted pyramid. *S. Jacobœa* L. is practically absent, being limited to a small area of the coast near Scalloway, whereas *S. aquaticus* is frequent as a roadside weed, and is especially noticeable in fallow and derelict potato- or oat-fields, where from a distance it suggests *Chrysanthemum segetum*. (Dr. Druce suggested the name var. *ornatus* for the Shetland form.)

Plantago. On the wind-swept disintegrated serpentine hills to the north of Balta Sound grow many forms of *P. maritima* with *P. Coronopus* and variable *P. lanceolata*. One plant in particular belonging to the *maritima* section was quite striking from its conspicuous woody rootstock thickly beset with the persistent leaves of former years' growth ; the leaves themselves crowded, broad, short, and very hairy with loose rather short shaggy hairs ; the inflorescence short. This form is not, I think, represented in Beeby's gatherings ; nor does it seem to be known from the Faroes. It may be in part what some botanists call *minor* Hook. ; others would refer it to *hirsuta* Syme. Hooker founded his *minor* upon an Orkney plant described as having linear lanceolate leaves. Syme (Eng. Bot. vii. 172) changed the name to *hirsuta*, describing the leaves as linear-strap-shaped or semi-cylindrical. Such a form does occur both in Orkney and Shetland, but the form now described (for which Dr. Druce suggests the name *P. Edmonstoni*) has shorter broader leaves which recall those of *Echeveria*, often having a pruinose sheen. The *P. setacea* var. *lanosa* of Edmonston's Flora Shetl., a narrow-leaved plant in which the

leaf-bases have a tuft of white hairs, also occurs in both Orkney and Shetland as well as on the Scottish mainland. Plants with short broad hairy leaves also occur in Orkney, as at Hellie Hoy, but they are not so sturdy as that from Balta, which so far I have failed to match in herbaria. Cultivation and further study are necessary to determine whether it may be a distinct species, and also to eliminate the possibility of a hybrid parentage. *P. lanceolata* might afford the hairiness and broader leaves, but its root branching and leaf arrangement are quite different.

Rhinanthus grœnlandicus Chab. was found in both the known localities on a holm in Burga water, where it was discovered by Beeby (see Ann. Sc. Nat. Hist. 1907, 233), and on the cliffs at Saxavord. Ostenfeld reports it as frequent in the Faroes and clearly distinguishable from *R. minor*, being allied to *R. borealis* and *R. Drummond-Hayi*.

Potamogeton suecicus (Richt.). One of the special objects of my northern visit was to clear up the question of the recorded occurrence of *P. vaginatus* Turcz., to which Bennett had referred the specimens gathered by Beeby in the Lochs of Asta and Tingwall. My examination of Beeby's herbarium led me to doubt the accuracy of this identification, which has been subsequently questioned by Hägstrom (Crit. Research. Pondweeds). We paid three visits to these lochs, which lie in an interesting valley about six miles from Lerwick, but were only able to collect barren specimens of plants which seem identical with those obtained by Beeby. Hägstrom unhesitatingly rejected these from *P. vaginatus* and refers them to *P. suecicus* Richt., a hybrid between *P. pectinatus* and *filiformis*, as var. *intermedius* forma *pectinatoides* Hägstr. *P. vaginatus* Turcz. may therefore disappear from our list.

P. rutilus Wolfg., hitherto only known with certainty from Lyn Coron, Angelsea, we found growing plentifully in the Lochs of Tingwall and Asta, and also in the Loch of Bardister at Walls.

A short time was spent in the Orkneys, where we had the advantage of the company of Colonel H. Halcro Johnston, F.L.S. This resulted in adding two species to the Scottish flora—a *Nitella*, identified by Mr. James Groves as *N. nidifica* Ag., which we dredged up in the Loch of Stenness, and previously only recorded from an aged specimen too poor for figuring, found by the Rev. E. S. Marshall in 1896 in a lagoon north of Wexford Harbour, and *Chara canescens* which was growing with it, and hitherto known only from the south of England and Wexford.

NOTICE.

The collection of portraits of Naturalists recently added to and rearranged by Dr. W. Rushton Parker, can be readily consulted as it is housed in a cabinet in the Council Room.

The Linnean portraits form a collection distinct from the foregoing, but can be easily inspected.

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Robotham, F. E., deceased, 24.
Rogers, *see* Coltman-Rogers.
Rolfe, R. A., death reported, 22, 24; obituary, 52.
Rothschild, The Lord, appointed V.-P., 60; elected Councillor, 25.
Ruscus aculeatus, Linn., seeding and germination (Dymes), 11.

Saccardo, Prof. P. A., obituary, 53.
Salisbury, Dr. E. J., elected auditor, 20; elected Councillor, 25.
Salmon, C. E., elected Councillor, 25.
Sander, H. F. C., deceased, 24; obituary, 54.
Sargent, Prof. C. S., accorded special vote of thanks for Donation of books, 17.
Sastrin, *see* Ramana-Sastrin.
Schenkling, S., Coleoptera: Cleridæ, 22.
Scott, Dr. D. H., Linnean Medal presented to, 3.
Scott, Dr. H., Coleoptera: Scydmænidæ, &c., 22; Distrib. of Staphylinidæ, 22.
Scrutineers appointed, 25.
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Sea-pens, On two (Hickson), 23.
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Sen, Prof. R., elected, 60; proposed, 6; sec. reading, 8.
Sewell, Major R. B. S., read Dr. Annandale's paper on Chilka lake, 63.
Sharngapani, S. G., elected, 60; proposed, 11; sec. reading, 15.
Sheppard, A. W., appointed Scrutineer, 25.
Sherbornina, a new genus of Fossil Foraminifera from Tasmania, 18.

Sherriffs, Dr. W. R., proposed 23; sec. reading, 60.
Shetland plants (Druce), 14.
Sibour, Louis Blaise, Vicomte de, elected, 5; sec. reading, 3.
Sladen Trust, *see* Percy Sladen Trust.
Small, W., elected, 60; proposed, 5; sec. reading, 6.
Smith, Miss A. L., Councillor retired, 25.
Smith, S. G., admitted, 20; elected, 15; proposed, 1; sec. reading, 6.
Smith, Miss M., proposed as an Associate, 60; sec. reading, 62.
Smith, *see* Dorrien-Smith.
Sparrow-Hawk, Further researches (Owen), 2.
Speyer, E. R., Insects in relation to the reproduction of Coniferous Trees, 23.
Sprague, T. A., elected Councillor, 25.
Spratt, Miss E. R., admitted, 14; elected, 5; sec. reading, 3.
Stapf, Dr. O., appointed Scrutineer, 25.
Staphylinidæ from the Indian Ocean (Bernhauer), 22; Distrib. (Scott), 22.
Stayner, Capt. F. J., admitted, 22.
Steel, T., withdrawn, 24.
Steindachner, Dr. F., death reported, 8; obituary, 55.
Stevens, W. S., proposed, 22; sec. reading, 23.
Subramaniam, L. S., proposed, 60; sec. reading, 62.
Sutcliffe, H., elected, 22; proposed, 5; sec. reading, 6.
Symons-Jeune, Capt. B. H. B., admitted, 22; elected 15; proposed, 1; sec. reading, 6.
Symons, J., deceased, 24.

Taborn, C., elected, 62; proposed, 22; sec. reading, 23.
Tagart Bequest, volumes purchased by means of, shown, 2.
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Tattersall, Dr. W. M., Amphipoda and Isopoda from the Abrolhos Islands, 23.
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Tepper, J. G. O., withdrawn, 24.
Teratology of *Datura*, Linn., Contrib. to (De Toni), 12.
Thompson, P., moved the vote of thanks for President's Address, 39.
Treasurer, Annual Report, 23, 26–28; elected (H. W. Monckton), 25.
Turnbull, J. G., removed from List, 24.
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Tutt, J. F. D., elected, 62; proposed, 17; sec. reading, 19.

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Waddington, H. J., withdrawn, 24.
Wailes, G. H., withdrawn, 24.
Walker, A. O., exhibited *Papaver umbrosum*, hort., showing carpellody of the stamens, 62.
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Walsh, Lt.-Col. J. H. T., Councillor retired, 25; on certain Flagellates, 9.
Watts, Rev. W. W., deceased, 24.
Webb, W. M., exhibited rare woodlouse, *Ligidium hypnorum*, 62.
White, J. W., elected, 62; proposed, 19; sec. reading, 20.
Whyte, Rev. A., deceased, 24.
Wibberley, Prof. T., elected, 62; proposed, 20; sec. reading, 22.
Wiesner, Prof. J. von, obituary, 59.
Willis, Dr. J. C., Endemic genera in relation to others, 3.
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Wollaston Expedition Mosses, *see* Dixon, H. N.
Wolley-Dod, Lt.-Col. A., elected, 5; sec. reading, 2.
Woodlouse rare in Britain exhibited (Webb), 62.
Woodward, Dr. A. Smith, elected President & Councillor, 25.
Wortley, E. J., elected, 22; proposed, 5; sec. reading, 6.

Yoshida, Dr. S., admitted, 19; proposed, 6; sec. reading, 8.

Zoological Secretary (Prof. E. S. Goodrich), elected, 25.

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